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REPORT OF COMMISSIONER OF NAVIGATION.

The annual report of the United States commissioner of navigation shows that on June 30, 1902, the documented tonnage of the United States was the largest in our history, comprising 24,273 vessels of 5,797,902 gross tons. The increase over last year is almost wholly in large steel steamers, built by relatively few ship building plants for relatively few ship owning corporations. The normal tendency of ship building and ship owning is accelerated in the United States by liberal appropriations for deeper, wider and straighter channels, based on the fact that large steamers are more economical carriers and do more to promote our foreign and domestic commerce by water. In ten years the number of American, British and German square-rigged vessels has decreased 50 per cent.

Tonnage registered for foreign trade shows a slight and unexpected decrease of 6,574 tons, which is more than offset by its increased efficiency as steamers supersede sail vessels. American vessels carried 8.8 per cent, of our exports and imports, compared with 8.2 per cent. in 1901.

The outlook for steel ship building in the United States for the current fiscal year is not so promising as was last year's, but the same is true of Great Britain, where 1,000,000 tons of steel vessels were building on Sept. 30, 1902, compared with 1,400,000 tons on Sept. 30, 1901. On July 1, 1902, there were building or under contract in the United States, 347,500 tons of steel merchant vessels. A large percentage of the total has been finished in the first quarter of the year and no new large contracts on the seaboard are reported.

The report contains a review of the crews (excluding masters) required to man the sea-going vessels of the United States of over 100 tons, foreign and coasting trade combined. In round numbers American sea-going steamers require 24,000 men, American square-rigged vessels 6,000 men and American schooners 10,000 men. These are divided, according to the work they perform, into: Officers, (excluding masters) 4,400, petty officers 2,700, seamen 14,800, cadets 100, boys 700, engineers 2,600, water tenders 400, oilers 1,200, firemen 3,500, coal passers 2,600, electricians, etc., 300, cooks 3,200, stewards 2,500, stewardesses 300, miscellaneous, including pursers, doctors, etc., 700.

Crew lists indicate that 21,000 are Americans born or naturalized and 19,000 are foreigners. The American proportion in the coasting trade, of course, is larger than in the foreign trade and is increasing. The foreign elements in our crews seem to be substantially as follows: British 5,700, Scandinavians 4,800, Germans 2,000, Russians 900, Austrians 300, Italians 800, Chinese 600, French 300, Japanese 300, Portuguese 700, Spanish 900, all others 1,700. By comparison it is noted that in 1900 British vessels were manned by 175,000 British, 37,000 foreigners and 36,000 Lascars and Chinese. The crews of merchant ships of other nations are mainly composed of subjects or citizens of the country whose flag is borne.

Receipts from tonnage taxes amounted to $868,784, of which only $68,173 were paid by American vessels. British vessels paid $496,043, German vessels $114,109. Vessels from Great Britain paid $276,449, from Germany $101,529.

Last year 2,122 ocean steamers of 7,300,000 gross tons, including several hundred small tramp steamers, entered American ports in foreign trade. The export, import and passenger business of the United States would require the continuous employment of 1,350 steamers of 4,900,000 tons, or over 20 per cent. of the world's foreign-going steamers. We employ, however, 40 per cent. of the large and fast steamships of the world. Speed is less useful to commerce than great size in steamers, but American trade exacts both. American requirements have thus intensified the tendency in ocean trade towards centralization.

The report deals at length with the transatlantic merger and its fleet of over 1,000,000 tons. The organization of so great a navigation company under American auspices is, however, the most important step toward the establishment of the influence of Americans on the ocean which has been taken, since, through the rebuilding of the navy, modern ship building plants were developed in the United States. The relations of the merger to the trade of the United States will be exceptional, the only parallel being the relations of the two great German lines to Germany's commerce.

Since 1894 steamers in the foreign trade of the United States under foreign flags but owned by a large—probably a majority—interests of American capital have increased from 200,000 tons to over 1,000,000 tons. In the same interval, steamers under American register, including those in Hawaiian trade, have increased from 224,000 tons to only 398,000 tons. The policy of subsidies is the only method at the present time by which American-built steamers with American crews can obtain any considerable share of foreign trade.

The repeal of compulsory pilotage on sail vessels in the coasting trade and minor changes in the navigation laws are recommended.

The report reviews the world's ocean steamship commerce for 1901 on the basis of reports of steamship companies owning about 40 per cent. of the tonnage in the world's foreign and colonial trade. These reports indicate that the world's foreign-going steamers in 1901 were valued at about $1,000,000,000 and that gross receipts were about $850,000,000, out of which $50,000,000 in dividends and $9,000,000 interest on bonds were paid. Wages to crews amounted to about $62,000,000. The report will be printed late in November.

SECRETARY ADOPTS MAJORITY REPORT.

Rear Admiral George Wallace Melville, chief of the bureau of steam engineering, submitted a minority report to the secretary of the navy expressing his disagreement with the other members of the board of construction in deciding that the new armored cruisers, Washington and Tennessee, shall have 23,000 H. P., instead of 25,000 as advocated by Admiral Melville, with speed of only about 22 knots instead of 23 knots for which Admiral Melville contended. Admiral Melville argues that congress intended that these vessels should be equal or superior to any of their type. As they were authorized as armored cruisers and not as battleships, he holds that speed was the main essential and that armor and armament should be subordinated to horse power. The "trial displacement" fixed by congress for each of these vessels was 14,500 tons, but Admiral Melville says that when the Washington and the Tennessee are ready for sea each will have a displacement of 16,000 tons. With 23,000 H. P. the vessel with this displacement, he asserts, will make only 20.8 knots, or fully a knot and a half less than the vessels of the British armored cruiser Drake class when that vessel is also deeply loaded. The better protection of the Washington and the Tennessee, he says, is offset by their great inferiority in speed. Of the Drake class, he says that with great speed and large coal capacity, they can visit an enemy's coast "and devastate it at will unless that enemy has vessels of equal or greater speed and power to meet them, the speed being of fully as much importance as the battery."

"When we remember," adds Admiral Melville, "the fright caused in 1898 by the appearance of a phantom fleet on our coast, we can easily imagine the panic that would occur if a squadron of the Drake class happened along, for none of our ships could overtake and engage it on anything like equal terms; the light, fast ships would be no match in battery and protection, and the heavy fighting ships and vessels like the Maryland (battleship) and the Tennessee could not overtake it."

Admiral Melville expresses disbelief in the claim of the majority of the board on construction that 23,000 H. P. will give the Tennessee and Washington a speed of 22 knots, and he says he bases this on the performance of somewhat similar ships. He holds that the experiments with models in the model tank at the Washington navy yard are not reliable in determining the speed of naval vessels.

The majority of the board on construction has submitted an answer to Admiral Melville's objection. The majority's argument follows the line of Rear Admiral O'Neil's comments on the subject of "speed versus armor and armament," contained in his annual report. Admiral O'Neil is chairman of the construction board and chief of the bureau of ordnance. He holds that naval powers should not be influenced by the "speed craze," as he calls it, and that it is better to make virtual battleships of the Washington and Tennessee by giving them plenty of armor and heavy batteries, than to build them mainly for speed.

The secretary settled the controversy by adopting the majority report and announced that proposals for building the vessels will be received at the navy department on Jan. 6, 1903.

Ex-Judge E. H. Gary, chairman of the executive committee of the United States Steel Corporation, in answer to a question as to whether the corporation was contemplating a reduction of output, said:

"The policy of the corporation is to maintain reasonable and steady prices. We use our influence against an increase in prices and also against a decrease in prices, if those which obtain are fair and reasonable. If competitors in any locality and concerning any commodity cut prices in order to secure an advantage, our people immediately inquire carefully into all the facts. If there is justification for a decrease in prices our people promptly meet the conditions, and all our customers are treated alike. We desire and seek the friendship of our competitors, but look first to the protection of our customers. We have on our books about 5,000,000 tons of unfilled orders, and are booking weekly as much or more than we manufacture and ship."

THE NEW CUNARD SHIPS.

To be built as a result of late agreement with British Government—History of Cunard Company.

Glasgow, Oct. 27.—The interest of the moment in the shipping world is the arrangement between the government and the Cunard Steamship Co. and all that pertains to it. We regard the Cunard company as a Glasgow institution. We are therefore very much interested in the new ships they are to build, and in fact in everything pertaining to the company. At the risk of some repetition I am also giving later on in this letter, a brief history of the company. But first to the agreement and to the new ships:

Speaking in Glasgow a few days ago, Lord Inverclyde, chairman of the Cunard company, sought to emphasise the fact that the agreement made by the company with the government had been drawn up purely upon business lines and purely upon a commercial basis, and that there had been no sentiment in the matter whatever. With regard to the increased payment which was to be made to the Cunard company, he declared it was not a subsidy, in the sense of a bounty, nor in the sense as defined in the dictionary as "aid" or "succor." The agreement was one that had been made on business lines, and the payment which was to be made to the Cunard company was part of the business bargain that had been made between the two contracting parties. In return for that payment the Cunard company gave up certain defined saleable rights. These include a pledge that the Cunard company should be made purely a British undertaking, and that it should hold at the disposal of the government the whole of its fleet. The most important point, however, was that the Cunard company undertook to build two steamers of high power and great speed, far beyond what the company would contemplate if they were building ships purely for their own business, and the payment was supposed to represent the difference between what ships might earn if run purely on commercial lines, and what they would lose by having to come up to government requirements. Whether the amount was sufficient time alone would tell, but the sum was arrived at after much consideration, and, as the president of the board of trade stated, it "is not more than a fair remuneration for the services to be rendered." Moreover, there was no one in this country who would undertake to build two such ships as they had undertaken to do as a commercial transaction. Certainly any public company such as theirs would have difficulty in raising such a very large sum as would be required for the purpose of building these ships. It, therefore, came to this, that if the country desired that there should be ships belonging to Great Britain able to hold their own for size and speed, and to be suitable as fast cruisers for admiralty purposes, it was necessary that financial assistance should be given, such as was proposed between the government and the Cunard company. Lord Inverclyde said that he had many inquiries as to the prospects of their big ships being built on the Clyde. The order had not yet been placed with any ship builder, but certainly the Clyde ship builders would have an opportunity of tendering.

SOME PARTICULARS OF THE NEW SHIPS

The work in connection with the new Cunard ships will not now be long delayed. Already designs have been submitted and have been before the admiralty. These designs are for ships about 750 ft. long—nearly 50 ft. more than any existing ship—and to exceed 24 knots speed. They will have machinery of 48,000 to 50,000 I. H. P. Water-tube boilers will not be adopted. One point on which there is some uncertainty is as to whether the vessels will be propelled by two or three screw propellers. If two propellers were adopted there would require to be four engines—two on each shaft, as in the case of the 40,000 I. H. P. sets of the new German ship the Kaiser Wilhelm II.—and there is always the difficulty of transmitting such an enormous power through two shafts. It means 25,000 H. P. for each, and although the Cunard company adopted the greatest power in any one shaft in the case of the Umbria and Etruria, whose single screws have 14,000 to 15,000 I. H. P., it is a long step even from the German ship with 19,000 to 20,000 to the 24,000 to 25,000 I. H. P. of the new Cunarders. The shaft of the German ship is a formidable structure. For each engine the weight is 226 tons. The six-throw crank is of nickel steel, which has a breaking strain of 38.41 tons per square inch, with an elongation of 21 per cent., and weighs in all 114 tons. The thrust shaft is of similar material, but the intermediate shafts are of Siemens-Martin steel, and the propeller shaft of crucible steel. The ingot for the latter weighed 80 tons, and was cast with the contents of 1,768 steel smelting crucibles, the operation occupying 490 men during thirty minutes. The other alternative to the adoption of only two shafts is three screws, each with its own engine, which would divide up the power to about 17,000 I. H. P., an arrangement having many advantages from the engineer's point of view. But it will require much more engine room, as three engines cannot well be placed in the width of the ship along with condensers and auxiliary gear.

CONCERNS CAPABLE OF BUILDING SUCH VESSELS.

The leading vessels of the Cunard fleet were all built on the Clyde and it has all along been assumed that when a British firm thought fit to try conclusions with the Germans in the matter of fast ocean steaming, Clyde builders would have a fair chance of getting the new work. The Harland & Wolff establishment is out of the running by reason of its connection with the Morgan shipping combine, but there are other competitors. Vickers, Sons & Maxim will try their best and the Northeast coast will willingly attempt a leviathan record-breaker if it can. Messrs. C. S. Swan & Hunter, Newcastle, have already built the Ivernia, a sister of the Saxonia.

Much depends on the action of the Clyde navigation trust, who have appointed a committee to deal with the whole matter of widening and straightening the Clyde within their jurisdiction. This committee consists of Lord Provost Chisholm, Sir David Richmond, and Messrs. Clark, Dunlop, Dunn, Gray, Mason, Primrose and Robertson. The terms of the remit to the committee do not refer specially to ship yard work. They are: "To inquire into and consider what additional harbor accommodation is required to meet the increasing trade of the port, and how best to supply it, and whether any improvement in straightening, widening, or deepening of the river is called for and can be effected, and to report to the committee of management for its consideration and decision."

The Campania and the Lucania, built at Fairfield are the largest vessels yet constructed on the Clyde. They both got down to the Tail of the Bank safely, but the increase in size necessary which the Cunard company now require, and also the taking down of the two new battleships of the King Edward class, which are being built at Fairfield and Clydebank, form a problem for both ship builders and Clyde trust. In the case of the battleships the difficulty will be caused by their great breadth, and in the case of the liners by their great length, which, in a bend of the river and considering the immense "swing" of a long vessel when turning a corner to all practical purposes constitutes breadth. The admiralty's latest idea, that builders should completely equip each vessel, putting armament of all kinds on board, will make the problem still more difficult of solution, as the vessels will be of somewhat greater draught than the builders calculated when the contracts were placed. There is, however, sufficient time to make great improvements on the waterway if operations are begun early. If a Clyde firm got one or both of the vessels to build two years at least would be required before they could be launched, and in that time the trust could do much.

The Fairfield company and John Brown & Co., Clydebank, may be considered as the only Clyde firms likely to tender for the new Cunarders. These firms are both pretty busy at present, but either could take both the vessels, and turn them out in record time. Clydebank has on the stocks the new battleship, the County cruiser Antrim, of which the keelson is laid; two big cargo steamers for London, one being framed and another plated; and another large vessel recently laid down. The cruisers Aurora and Pelorus, the Fleetwood steamer Duke of Connaught, and the new Furness-Withy liner are all in the fitting-out basin. Fairfield has the new battleship, a big Castle liner and four small Turkish steamers, with the war vessels Donegal, Diadem, Jason, and Fiary in the dock. Berths could easily be found for vessels bigger than any now afloat; and in both yards there would be no difficulty in getting them launched, as sufficient water for this can easily be obtained by placing the berths at a different angle to the river.

The "man in the street" does not know how few builders there are in the world who can turn out big new ocean flyers such as the Cunard company desire. Vickers, Sons & Maxim, Swan & Hunter, the Fairfield company and John Brown & Co. are the four concerns in the running for the work, and any of them could build an express boat of the stipulated speed which would bear comparison with the best afloat. The ship building task is comparatively easy for them. The following summary of builders of merchant ships of 10,000 tons and over may be interesting:

	Vessels.	Tons, gross.
Swan & Hunter	1	13,800
Fairfield company	2	25,902
Brown & Co.	7	82,365
Cramp & Sons	4	47,158
Newport News Co.	2	22,568
Schichau	3	37,232
Blohm & Voss	7	76,539
Vulcan Co.	11	143,624
Harland & Wolf	30	378,942

The Cedric is in the Belfast total at 21,000 tons, and the Kaiser Wilhelm II. in the Stettin total at 20,000 tons. The Harland & Wolff total includes the Teutonic and the Majestic at 10,000 tons.

STORY OF THE CUNARD COMPANY.

Samuel Cunard, the founder of the Cunard Steamship Co., was born in 1787 in Nova Scotia. He came to England in 1836 with the idea of establishing a mail service of steamers between Great Britain and America, and saw Robert Napier of Glasgow, head of the ship building yard now carried on by William Beardmore & Co. The result was that Napier built four steamers with which the service was to be inaugurated. A company was formed with the name "British & North American Royal Mail Steam Packet Co.," with a capital of £270,000 the bulk of which was raised by George Burns and David MacIver. The dimentions of the first Cunarders were:

Vessel.	Tons.	Length.
Britannia	1,156	207 ft.
Columbia	1,138	207 ft.
Acadia	1,136	206 ft.
Caledonia	1,138	206 ft.

They were all wooden paddle boats, and their speed at sea was about 8½ knots. In October, 1838, the government accepted the tender of the Cunard company for a fortnightly mail service from Liverpool to the United States at an annual subsidy of £55,000. The sailings were afterwards made weekly, and the subsidy was increased to £81,000 a year. The first vessel, the Britannia, sailed on her maiden voyage on July 4, 1840, so that the line is now over sixty-two years old. The next ships built were the Cambria and Hibernia of 1,422 tons and 9½ knots speed, and by 1848 the company had built four more vessels named America, Niagara, Canada and Europa, all paddle steamers of 1,825 tons and 10¼ knots. For twenty years the vessels of the Cunard Line were built of wood, but in 1860 the Persia, an iron paddle, steamer of 3,766 tons, was built. Her length was 350 ft. and horse power 3,600. The Scotia, which for some time held the record of 8 days 22 hours from New York to Liverpool, was the last of her big paddle boats constructed for the Cunard. She was built in 1862 and was of 3,871 tons, 4,200 H. P., and 367 ft. length. She was converted into a twin-screw vessel, and did good service later as a cable steamer. The China, launched in 1862, was the first Cunard screw steamer. In 1867 came the Russia, of 2,960 tons and 3,000 H. P., which averaged more than 14 knots, and reduced the record from New York to Queenstown to just over eight days. Later Cunarders were the Batavia, 2,553 tons; Calabria, Algeria and Abyssinia, each of 3,300 tons; Scythia and Bothnia, 4,535 tons; and Gallia 4,808. Steel next began to replace iron as the material for ship building, and in 1881 the Servia of 8,500 tons and 530 ft. long, was launched on the Clyde. In January, 1882, she broke the record with a passage from New York to Liverpool in 7 days 8 hours 15 minutes, but a few months later the Guion liner Alaska ran from New York to Queenstown in 6 days 22 hours. In 1888 the Cunarder Etruria did the westward passage in 6 days 1 hour 47 minutes.

The history of the Cunard company has been closely bound up with the struggle for the "blue ribbon" of the Atlantic. The Servia was 530 ft. in length and was the longest ship that had then (1882) been built, though she was soon eclipsed in this respect by the Anchor liner City of Rome. The Servia's sea speed was 17¼ knots. In 1884, however, the Umbria and Etruria were launched. These were sister ships, each of 8,127 tons and 501 ft. in length, with an indicated horse-power of 14,500. It was in 1891 that the most modern of the big Cunarders were ordered. These were twin-screw boats, the Campania and Lucania, the largest vessels, (except the Great Eastern) ever built up to that period. They were launched by the Fairfield Company, in September, 1892, and February, 1893. The dimensions of these vessels are:

Gross tonnage	12,950
Net tonnage	4,975
Length over all	620 ft.
Length between perpendiculars	601 ft.
Beam	65 ft. 3 in.
Depth from upper deck	43 ft.
Indicated horse-power	30,000

Of the two the Lucania is slightly faster. Their usual sea speed is from 21½ to 22 knots per hour, and their records are:

	Outward. Days.	Hrs.	Min.	Homeward. Days.	Hrs.	Min.
Lucania	5	7	23	5	8	38
Campania	5	9	6	5	9	18

The Cunard line is unique in one respect, in that it can boast that not a single passenger ever lost his life through a mishap to one of their vessels. The worst loss the Cunard company sustained was that of the Oregon, a fine new steamer, which, on March 14, 1886, was sunk by collision with an unknown schooner near Long island, but all those on board were safely transferred to the boats, and not a life was lost. The remarkable adventures of the Pavonia, which drifted about for days in a gale with her boilers loose, but was towed to harbor, and of the Etruria this year, which lost her propeller, and yet was taken into port without further damage, are not forgotten. The Cunard company has of late years built large first-class twin-screw steamers of great cargo capacity, fair sea speed, and with accommodation for a limited number of passengers, such as the Saxonia and Ivernia.

As of special interest at this time I reproduce the list of original subscribers to the Cunard company, in 1839. With the exception of Samuel Cunard, a Nova Scotian, all the subscribers were Glasgow men. The MacIvers, the Liverpool partners of the Burnses were resident in Liverpool, and the Bannermans in Manchester, the latter being brought into the concern through their brother-in-law, James Campbell, of J. & W. Campbell & Co. The Campbell-Bannerman family interest was the largest (£17,800) and to this might be added the subscription of Mr. Leckie Ewing, who was a family connection of the Campbells, bringing it up to £29,400. George Burns, the real founder of the company, was the last survivor of the original partners, and died in 1890, aged ninety-four. Samuel Cunard, the nominal founder, brought £55,000 to Glasgow, but George Burns, the life and soul of the promotion, found all the rest of the capital. At first his partners—the MacIvers, Martin, and his own brother, who was his senior—held back, but his perseverance succeeded in carrying them all along with him. Sons of some of the original subscribers are alive, such as notably Dr. Jas. A. Campbell, M. P. for Glasgow University, and Sir Henry Campbell Bannerman, M. P., both sons of Sir James Campbell. The list follows:

	Shares	Par value.
James Donaldson, cotton broker	160	£16,000
James Browne, insurance broker	116	11,600
James Wright, cotton broker	116	11,600
Thomas Buchanan, merchant	116	11,600
James Campbell, warehouseman	60	6,000
Robert Hinshaw, drysalter	109	10,900
Alex. Downie of Downie & Maclure	55	5,500
Wm. Brown of Kilmardinny	116	11,600
Robert Napier, ship builder	60	6,000
Robert Rodger, merchant	116	11,600
Wm. Campbell, warehouseman	55	5,500
Wm. Leckie Ewing of Arngomery	116	11,600
Arch. M'Connell of Thomson & M'Connell	20	2,000
Wm. Connal, merchant	116	11,600
Geo. Burns of G. & J. Burns	55	5,500
James Burns of G. & J. Burns	50	5,000
David MacIver of Burns & MacIver	40	4,000
Chas. MacIver of Burns & MacIver	40	4,000
Alex. Fletcher, calico printer	116	11,600
Alex. M'Aslan of Austin & M'Aslan	105	10,500
Alex. M'Aslan of Austin & M'Aslan	3	300
Wm. Stirling of Stirling Gordon & Co.	116	11,600
Elias Gibb, wine merchant	64	6,400
Jas. Merry of Merry & Cunninghame	37	3,700
David Chapman of Thomson & M'Connell	15	1,500
Alex. Glasgow of Auchenraith	64	6,400
Alex. Bannerman, Manchester	21	2,100
John Bannerman, Manchester	21	2,100
Henry Bannerman, Manchester	21	2,100
James Martin of G. & J. Burns	15	1,500
Dav. Scott	16	1,600
James M'Call of Daldowie	13	1,300
Alex. Kerr of Robertland	7	700
Sam Cunard, Halifax, N. S.	550	55,000

Stock of 2,700 shares and £270,000, 1839.

IN HONOR OF JOHN FRITZ.

Four hundred men, all interested directly or indirectly in the steel and iron industry, were present at a dinner given at the Waldorf-Astoria last Saturday night in honor of John Fritz, the oldest steel master in the country, on his eightieth birthday. The John Fritz gold medal for achievement in the industrial sciences was founded, to be awarded annually by a committee of the American Society of Civil Engineers, the American Society of Mechanical Engineers, the American Institute of Mining Engineers, and the American Institute of Electrical Engineers. The medal was designed by the American sculptor, Victor D. Brenner, and bears the head of John Fritz. Mr. Fritz is a native of Pennsylvania, who had a common school education, began life as a blacksmith, and nas been connected with almost every important step in the iron and steel industries; his principal work being the great forge and armor plate plant of the Bethlehem Steel Co., of which he was chief engineer and superintendent from 1860 to 1893. He is thought to be the only survivor of those who introduced the Bessemer steel process in the United States, and the leading men in that industry today are pupils of John Fritz. He was given, in 1893, the Bessemer gold medal by the British Iron and Steel Institute. Mr. Fritz says of himself:

"My inventions came to me as necessity demanded and I saw their need in my work. I am the most overrated and underrated man I know. There are a few of my inventions for which I don't wish to be remembered. These are the big ones that brought about advances and savings. The hundreds of small and labor-saving devices which I have invented are unknown to the world. For these I would wish to be remembered by the future."

Mr. Fritz is an optimist, and expresses the opinions that young men can get up from the blacksmith's forge today as easily as he could, and that in the future there will be vastly greater progress, since "the achievement of the past is merely a point of departure."

PURCHASE PRICE OF WHITE STAR LINE.

It has been officially announced that the purchase price of the White Star Line, which is to be paid by the Morgan shipping syndicate on Dec. 1, is £10,699,436. Of this amount £3,147,236 is to be in cash, £5,034,800 in preferred shares and £2,517,400 in common shares of the International Mercantile Marine Co. This is equivalent to over £10,000 to be paid for each £1,000 share, which will be at the rate of £4,196 in cash and £6,000 in stock of the Atlantic combination.

Offices of the International Merchant Marine Co. will be in the Bowling Green building, New York, where the offices of the White Star Line are at present. Various economies in concentration are contemplated.

CANADIAN FAST LINE PROJECT.

As vigorous a discussion as one may be able to find upon the proposed Canadian fast line project is contained in an article in the London Times from its St. John's, N. F., correspondent, who evidently writes from intimate knowledge of the situation. After an understanding of its positive physical dangers it is no wonder that insurance rates upon the Canadian service are high. A proposed fast service would magnify and not minimize these dangers. The correspondent writes:

In the vigorous controversy now being waged with regard to a fast Canadian steamship service, two points seem to be overlooked—(a) that the Newfoundland coast is the point on which the whole project turns, and (b) that, if a winter and a summer port are chosen, this will really involve three distinct routes. An explanation of the latter point will facilitate a more intelligent comprehension of the former. Most writers on the subject show a lamentable lack of knowledge of the actual conditions of "the St. Lawrence route," which, taken as a generic phrase, really comprehends, owing to the peculiarities of navigation there, three distinct and separate courses:

1. The winter route from, say Liverpool to Halifax and St. John, N. B., passing Cape Race and Sable Island, and used between December and April, when the St. Lawrence Gulf is blocked with ice.

2. The spring route, from Liverpool to Quebec and Montreal, rounding Cape Race, traversing the south coast of Newfoundland for 300 miles, and entering the Gulf via Cabot strait (which separates Newfoundland from Cape Breton); used between May and mid July, and sometimes until August, when Belle Isle strait is clear of ice.

3. The summer route, from Liverpool to Quebec and Montreal, passing through Belle Isle strait, on the north of Newfoundland, and used from mid July till the end of November.

The existence or importance of the second route is usually disregarded, with the result that an entirely erroneous idea of the merits of any fast line scheme is obtained. The uninitiated public are invited to believe that Quebec, to take the first calling port, is reached by the shortest route in summer, and Halifax by the shortest in winter, whereas, for three months of the year the route followed is one which has all the demerits and none of the advantages of either. We may discard for the present the question of speed, and profitably consider the subject of *termini*. The first principle to be kept in mind is that no conceivable effective route can be laid down which will not lie along the coast of Newfoundland. If it is via Belle isle, the ships run through a strait only ten miles wide in parts. If it is via Cape Race, practically all the shipping of two hemispheres sight that promontory; and there are no other routes possible. And the danger point of this Canadian service is not the St. Lawrence river, but the Newfoundland seaboard. A steamer grounds in the river, and, while the mishap is annoying, she is almost always got off and repaired. Another spits herself on the jagged rocks of our coast line, and hull and cargo become a total loss. One wreck of this kind is worse than a season's strandings in the river.

The ocean steamer bound from England to Canada enters the danger zone when she reaches the Grand Banks, 200 miles east of Newfoundland. Her first peril is from ice floes and bergs, her second from fishing schooners and derelicts, her third from dense fogs and variable currents, which combine to send her on the rocks. No class of ships is free from these dangers, and the "liner," which has to make time or lose prestige, is more liable to them than the "tramp," which can crawl slowly along and take every precaution. Indeed, it was the existence of just these three perils which compelled the New York steamship lines five years ago to hold a conference and abandon the banks altogether. Any track chart which has their present routes laid down will show that these are well south of the banks and some hundreds of miles longer than a direct line between the two *termini*, passing over the shallows, would be. But it was felt that the shortening of the route was purchased at too great a risk to life and property, and, though the northern passage had been made until then, it was unanimously abandoned for the longer, though safer, track.

It is, however, only the New York liners which use this ocean route; all other steamers adopt the line which passes by Cape Race. The Canadian fast liners plying to Halifax during the winter, or to Quebec during the spring, would have to do the same. Why? Because it is the natural course for them to run. It may be said, Can they not go south like the New York boats? The answer is, no; for that would lengthen their voyage to almost the distance of the New York voyage, and would destroy their claim to be considered a "fast" line. The dangers above detailed are, unfortunately, not slight ones, as a whole series of object lessons proves. In the winter and early spring the fields of ice cumber the ocean. It is ruin for a steamer to get immeshed in them. Take the big White Star freighter Naronic, crossing eight years ago. She vanished with all hands, and nobody familiar with North Atlantic navigation doubts that she struck an icefloe and foundered. The same fate befell the State of Georgia in 1808, and the Allan freighter Huronian last winter. This list might be extended considerably, but these are conspicuous cases; war-ships sought or were sent to search for them, and a Newfoundland seal ship was employed to cruise among the floes for the State of Georgia. The fast Canadian liners must expect these conditions in winter, and they are not conducive to speedy voyages. In the spring and summer, if Halifax is continued as the terminus, or while the steamers ply via Cabot strait to Quebec, there is the danger of running over fishing boats, ramming icebergs, or colliding with derelicts. The Grand Banks are the seat of the greatest cod-fishery in the world, and from April till November fully 1,000 vessels, manned by 20,000 men, are employed in gleaning this marine harvest The region is usually enwrapped in fog, and, as the steamers race along, they often cut down the little smacks and drown the crews. It was the frequency of such occurrences and the continuous bombardment to which the newspapers subjected the liners for their brutality in causing these disasters that probably, more than anything else, induced the companies to abandon this area. Columns could be filled with narratives of these mishaps, but the essential fact is so well known that it needs no corroboration. Collisions with icebergs are of almost equal frequency. Liners and freighters encounter them, and not a summer passes without St. John's having one or more broken nosed steamers put in for repairs, while some are so badly battered that they do not survive the impact. Encounters with derelicts occur everywhere, and would be a negligible consideration, but that the Grand Banks appear to be their main gathering place—a question of currents, doubtless.

The dangers of wrecks on our coast are attested by long lists of disasters near Cape Race, almost 100 in forty years. Last season eight steamers and two sailing vessels were totally wrecked on our southern seaboard; this year one steamer and two sailing ships are recorded so far. But it must not be forgotten that narrow escapes are common. When the Delmar was lost last summer the evidence adduced showed that two other ships were almost ashore within a few hours, the victim's whistle warning off one, and a salvage tug the other. The same thing has happened more than once this year, and, but for the presence of the fishing craft off the shore, many other big ships would come to grief there. The trouble is caused by the fogs, which prevent mariners from securing proper reckonings, while north-running currents deflect the ships from their proper course, so that they bring up in the surf. Nor is it steamers which are in the Canadian route alone that meet disaster here. On the contrary, ships from Galveston, Wilmington, Baltimore, Philadelphia, New York and Boston have all been lured to destruction near that headland, the peculiarity of the region being that east-bound and west-bound craft alike are prone to misfortune there. The cape projects out into the Atlantic, and the great circle sailing track which sweeps along the American seaboard just grazes it, so that a ship following the natural line and erring even slightly in her navigation cannot escape. Within twenty-four hours, in 1900, three steamers struck there—one bound from Liverpool to Montreal, a second from Baltimore for Christiania, and a third from Halifax, N. S., to this port. In these circumstances, then, it is evident that a line passing Cape Race, be the terminus Halifax, Sydney, or Quebec (through Cabot strait), is liable to such serious dangers as to militate against its efficiency as a "fast" line. A genius suggests that all ships should keep a course 40 miles south of the cape, the fact being overlooked that this is just what the shipmaster does now; only his reckoning is discounted by the currents and fogs and he is left with a battered steamer to reflect upon the ease with which the best navigation may be set at naught.

Ships traversing the gulf via Cabot strait also meet mishaps about Cape Ray at times, where cross-currents make trouble, but this is the least dangerous portion of the whole coastline upon which these ocean courses impinge. The large Hamburg-American freighter Arcadian went ashore near Cape Ray when outward bound in May, 1899, but was plucked off soon by the British war ships of our fishing patrol. Several other accidents have occurred there, but nothing in the shape of a serious catastrophe. If, as seems to be the aim of the leading Canadian advocates of the fast line, the summer terminus is to be Quebec, it must be remembered that, to reach that port, from May to mid-July, Cabot strait must be used. The gulf frees itself of ice late in April, and steamers can then enter. But this not a fast route *per se*, nor is it capable of being made so. It is 180 miles longer than the track via Belle Isle strait; it therefore means at least an extra half-day in the journey. It is proposed in some quarters to take on or put off passengers and mails at Sydney, Cape Breton, but that would involve a thirty-six-hours' journey by rail to Montreal, when the trip there by boat would be very much more enjoyable.

Not until after July 15 is the Belle Isle route or the St. Lawrence summer channel available. The reason is that this waterway, to the very north of Newfoundland, is in almost a sub-Arctic latitude, and the mighty icefields, carried south from Greenland are sucked in against the coast by the currents which sweep through the strait, and an impassable barrier is thus presented to all ocean shipping. Yet another paradox in this problem of ice navigation is presented by the fact that an iron or steel ship is not nearly so well able to withstand contact with ice as a wooden one is. That is why the whalers and sealers are all built of wood. Their planking is several inches thick, and their buoyancy is enhanced, while they can meet buffets from bergs and nips from floes with impunity. A plated hull, however, offers only the resistance of a shell not ¼ in. thick, and when a heavy ice mass strikes this it either drives in the plate, cracks it, or draws the rivets, and any of these mishaps spells disaster. Consequently, no master of a modern ship will

risk her among the floes, and sometimes when the ice lingers late near Belle Isle, as in 1900, it is well into August before one gets through. For practical purposes, then, this route is reasonably navigable only during August, September, October and November. But during the first two of these months there is the risk of collision with wandering bergs. It was on Aug. 28, 1896, that the steamship Strait of Gibraltar, outward bound from Montreal, struck a berg in the middle of Belle Isle channel and foundered, the crew reaching the neighboring coast. A score or more of steamers could be named which hit iecbergs there and managed to get to St. John's for repairs. Fogs and currents likewise work mischief there, as witness her majesty's ship Lily, which became a total wreck near Forteau in October, 1890, and the Dominion liner Scotsman in September, 1899, besides a long array of other ships between. The proposed mail boats will not be exempt from these dangers, intensified as they are by the narrow, tortuous channel that has to be traversed. It is, admittedly, possible to do much to lessen the likelihood of wrecks occuring by providing coast aids along the strait shore, but fog must always prove a difficulty. The sailor's proverbial good fortune alone prevents many more disastrous groundings, but the Mexico, Mariposa, Ipsden and Baltimore City, to mention only some of the cases in recent years, testify eloquently to the dangers of this waterway. Indisputable evidence is furnished by fishermen and others of the frequency with which passing steamers get into positions of danger through the presence of the blinding fogs, and the wonder is rather that so few wrecks do occur there than that they are so many. If the fast "ferries" are to make good speed in these constricted waters, it must certainly be by taking such risks as few unfamiliar with the navigation problems in these latitudes will realize the gravity of, and it requires no gift of prophecy to declare that, if the liners are sent racing through Belle Isle strait in order to maintain a speed schedule, the result will be disastrous alike to ships, owners, and passengers.

A peculiarity about the Bell isle route is that most of the disasters occur at its western extremity, outward-bound ships being the victims, though a notable exception was the Scotsman. This arises from the fact that the coast forms an acute angle with the track the ships follow; the approach to the strait is a funnel-shaped one, and a trivial divergence suffices to make a mishap certain. These conditions can be remedied in great part by improving the lights, whistles, and other coast aids, but the route will prove a risky one, and almost hopeless for making rapid runs. As regards the groundings in the river, they are mainly due to incompetent pilots, as in the case of his majesty's ship Indefatigable last September, which was run ashore at a point where the channel was 600 ft. wide and any competent man must have been sure of his position. As it was, it cost $125,000 to repair her, and a dozen other ships also met injury from the same cause. Until Canada reforms her pilotage system numerous accidents must occur in the river, and until she improves her safeguards along our coast the percentage of total losses will remain unduly high; but, apart from these facts, the natural disadvantages of the route are not to be disguised.

In one sense the phrase "a fast line" is a misnomer when applied to the Canadian route. To put on 23-knot steamers via Halifax or Quebec, like those which are running via New York, would be to invite disaster, on the one hand, through their attempts to make the same speed, or ridicule, on the other hand, through cautious running to avoid the dangers along the route. To say that the Canadian route is as safe as the New York is to disregard facts. The New York boat has no icebergs, fishing vessels, or fog-bound coast to contend with. It is true that the New York offing is not always free from fog, but it is equally true that fog there has none of the terrors it possesses about our coast or up the St. Lawrence river.

The Nova Scotian coast is equally notorious for wrecks. The Allan liner Grecian was put ashore near Halifax last winter and the German tramp Blaamunden near Whitehead in the spring. Sydney also has its share of casualties to face, so that no single section of the various routes can be said to have a clean record. In these circumstances the wisest course would appear to be to use 20-knot boats, running to Quebec in summer and Halifax in winter. They would represent a substantial increase on present speeds and yet avoid the suspicion of trying to compete with the New York boats, a competition that can never prove effective. The long and melancholy catalogue of shipping disasters along the Newfoundland seaboard of late years, embracing as it does representative ships of every one of the great ocean lines, is eloquent in disproof of the theory that fast Canadian steamers can be run except under risks that are prohibitory, both financially and otherwise. To-day ships plying via Canadian ports pay twice the insurance of those plying via American ports; under the conditions I have sketched the disparity would become even greater, because marine underwriters would be the first to realize the increased risks.

The United States Steel Corporation has cut the price of tin plate from $4 to $3.60 a box. The change applies to new equipments only and will not become operative until Dec. 1. In old stock no change is expected to be made for several months. It is an interesting fact that the United States Steel Corporation has not advanced the price of a single article since it was organized.

PROGRESS ON NEW NAVAL VESSELS.

Progress of construction on the numerous vessels building for the United States navy at different ship yards throughout the country is shown in the following table:

Name.	Building at	Degree of completion. Per Cent. Oct. 1.	Nov. 1.
	Battleships.		
Maine	Cramp & Sons	96	98
Missouri	Newport News Co.	74	76
Ohio	Union Iron Works	64	64
Virginia	Newport News Co.	7	9
Nebraska	Moran Bros. Co.	9	10
Georgia	Bath Iron Works	15	16
New Jersey	Fore River S. & E. Co.	15	18
Rhode Island	Fore River S. & E. Co.	15	18
Connecticut	Navy Yard, New York		0
Louisiana	Newport News Co.		0
	Armored Cruisers.		
Pennsylvania	Cramp & Sons	32	34
West Virginia	Newport News Co.	35	39
California	Union Iron Works	13	14
Colorado	Cramp & Sons	35	38
Maryland	Newport News Co.	33	37
South Dakota	Union Iron Works	11	12
	Protected Cruisers.		
Denver	Neafie & Levy	84	85
Des Moines	Fore River S. & E. Co.	75	75
Chattanooga	Lewis Nixon	63	68
Galveston	Wm. R. Trigg Co.	64	65
Tacoma	Union Iron Works	54	55
Cleveland	Bath Iron Works	88	89
St. Louis	Neafie & Levy	7	9
Milwaukee	Union Iron Works	6	6
Charleston	Newport News Co.	17	18
	Monitors.		
Nevada	Bath Iron Works	98	98
Florida	Lewis Nixon	94	95
Wyoming	Union Iron Works	95	98
	Torpedo Boat Destroyers.		
Bainbridge	Neafie & Levy	99	99
Barry	Neafie & Levy	99	99
Hopkins	Harlan & Hollingsworth	95	95
Hull	Harlan & Hollingsworth	95	95
Lawrence	Fore River S. & E. Co.	99	99
McDonough	Fore River S. & E. Co.	98	98
Stewart	Gas Engine & Power Co.	96	99
	Torpedo Boats.		
Stringham	Harlan & Hollingsworth	98	98
Goldsborough	Wolff & Zwicker	99	99
Blakely	Geo. Lawley & Son	99	99
Nicholson	Lewis Nixon	98	98
O'Brien	Lewis Nixon	98	98
Tingey	Columbian Iron Works	75	75
	Submarine Torpedo Boats.		
Plunger	Lewis Nixon	97	98
Adder	Lewis Nixon	99	99
Grampus	Union Iron Works	88	89
Moccasin	Lewis Nixon	99	99
Pike	Union Iron Works	80	81
Porpoise	Lewis Nixon	98	98
Shark	Lewis Nixon	98	98

SHIP BUILDING DURING OCTOBER.

The bureau of navigation, treasury department, reports 127 vessels of 33,504 gross tons were built in the United States and officially numbered during October as follows:

	WOOD.				STEEL.				TOTAL.	
	SAIL.		STEAM.		SAIL.		STEAM.			
	No.	Gross.	No.	Gross.	No.	Gross.	No.	Gross.	No.	Gross.
Atlantic & gulf	66	4,527	20	3,184	1	2,473	3	964	90	11,148
Porto Rico										
Pacific	5	1,649	7	1,068					12	2,717
Hawaii										
Great lakes	1	2,704	4	136			5	16,374	10	19,214
Western rivers			15	425					15	425
Total	72	8,880	46	4,813	1	2,473	8	17,338	127	33,504

The largest vessels in the list were the Moses Taylor, the John B. Cowle and the Muncy, all lake vessels.

The Nautical Preparatory school, incorporated in Rhode Island under a special charter, is said to have given a contract to the Perth Amboy Ship Building & Engineering Co., Perth Amboy, N. J., for the construction of the schoolship Young America. The vessel, complete with stores aboard, will cost $290,000. The purpose of building the ship is to afford a four years' course afloat with advantages of travel and foreign observation to the patrons of the school.

AFFAIRS AT HEAD OF THE LAKES.

Duluth, Nov. 5.—Most of the grain now in store at the head of the lakes is chartered for shipment to Buffalo or other lower lake ports. More flax than wheat is under charter, and is to be moved soon. Some of the larger receiving and shipping firms are holding on to their wheat and say they will make no shipment at this time and probably not this fall. They claim that wheat is sure to be worth more later. One of these concerns is reputed to be quite close to the Minneapolis Milling Co., that was found last spring to be the possessor of nearly all the milling wheat in store in that city. Country elevator lines are pumping their wheat into Minneapolis in preference to the head of the lake, expecting the sharp demand to come there for milling purposes, rather than here for shipment. One very large line is said to have sold less than 10,000 bu. in Duluth in the last ten days. This city is getting now from 200 to 300 cars per day, but this volume is likely to diminish shortly. The stocks here now are only about 40 per cent. of this time last year, and are increasing slowly. Shipments are large weekly, both of wheat and other grains. For the past seven days the total shipments from here were 4,000,000 bu. of which 1,713,121 were wheat and 1,654,733 were flax. There is not as much demand for vessel capacity as there had been.

Exporters claim they are out of line for foreign business so far that inquiries are noticeably absent, and that they do not expect to do any business this fall. They look to see all the northwestern American wheat wanted on this side. They are, however, doing something all the time in Manitoba wheat and are selling for export there steadily. It is stated that up to Nov. 1, 13,000,000 bu. of the northwestern Canadian crop had been handled through Winnipeg, of which 7,000,000 bu. has been shipped via Lake Superior, 2,000,000 bu. is in store at the upper lake Canadian ports of Port Arthur and Fort William and 4,000,000 has been taken by millers. It is claimed that 9,000,000 bu. more can be moved out of the country before the close of navigation, but this exporters here fear is an overstatement. It would make a total of 22,000,000 bu., and the crop is claimed to have been 67,000,000 bu. of wheat alone, which indicates that storage facilities of the dominion will be pretty severely taxed before the coming spring.

Up-bound package freighters are bringing to Lake Superior ports a very large volume of freight and will be crowded till the close of navigation. It is reported that the Northern Pacific road will build an elevator system on the west side of Rice's point. The rumor lacks confirmation and is probably untrue, or at least premature. The same may be said of the report that the company is about to build a fleet of package freight ships, much as such a fleet would be of advantage to the railway company.

The Barker share of the Duluth-Superior continuous dredging contract has been completed and final estimates are being made. The Williams share will be done shortly. It was decided that the Barker portion must be done first so that there should be no possible delay in the construction of the projected piers at the Superior entry.

Whitney Bros. of Superior have raised the machinery of the St. Andrew, sunk near Port Arthur. They have brought the outfit to Duluth for repairs and it will be put into a tug to be built by Jas. Whalen of Port Arthur. Whitney Bros. have been given a contract to remove the machinery of the wrecked Toledo, sunk near the entrance to the Portage lake ship canal in 1898, and they are beginning work.

Material for the hull of the new 8-yard dredge to be built the coming winter by the Duluth Dredge & Dock Co. is arriving from the coast.

Daily shipments of copper from the refineries of Lake Superior and from the stamping works equal about 250 tons of refined copper. All this is being shipped east and there is no accumulation of copper on upper lake docks in anticipation of winter. The close of navigation will find these docks bare of copper. It is expected that winter all-rail shipments will begin immediately on the close of navigation and continue steadily all winter.

The new Great Lakes Coal Co., which has been organized in the Pittsburg district by Guffy & Queen in association with old Carnegie Steel Co. officials and Duluth men, has what is believed to be an immense thing. The company is known to have 400,000,000 tons, and perhaps more, of coal on its lands, and is to open many mines at once. It has arranged for head of the lake docks for northwestern distribution, and these are to be on the Duluth side of the harbor above Rice's point. Large and finely equipped docks will be built.

The C. H. Bradley has unloaded the first coal cargo at the new Portage Coal & Dock Co.'s plant on Portage bay. The dock is equipped with clam-shell unloaders and can handle 200 tons an hour with eight men.

The Boston Coal Dock & Wharf Co. will increase the capacity of its Duluth dock from 200,000 tons storage to 500,000 tons, lengthening the dock from 900 to 2,200 ft. and adding equipment to correspond.

STEAMER FOR MONTREAL TRANSPORTATION CO.

Kingston, Ont., Nov. 5.—The Montreal Transportation Co. will add to its fleet of grain carrying steamers, and in this connection an order has just been placed with Messrs. Swan & Hunter, Wallsend-on-Tyne The new vessel will be even superior to the two steel ones the company a few years ago had built at Glasgow. Work will be started at once on the steamer and she is to be ready for service by April next. She will be of steel, 248 ft. in length between perpendiculars; 48-ft. beam and 23-ft. deep. The decks will be flush ones with the engines aft; the engines will be triple-expansion with cylinders of 22, 35 and 58-in. diameter and 39-in. stroke. Steam will be generated by two Scotch boilers, allowed a working pressure of 180 lbs. The steamer will carry grain between Lake Superior ports and Kingston, trans-shipping here. It will have a carrying capacity of 110,000 bu. of grain. The present big steamers of the company are considered among the finest in the grain carrying trade. Increase of business demands this addition to the fleet. Capt. Henry Thurston of Kingston, has just returned from England after making some minor arrangements as to the vessel's construction.

GOVERNMENT DREDGE ON LAKE ERIE.

The newspapers published a Washington dispatch during the week that in view of the immense amount of dredging to be done in Buffalo harbor and contiguous waterways, outside of general contract work, Gen. Gillespie, chief of engineers, proposes to furnish Maj. Symons, the engineer at Buffalo, with a deep-sea dredge. Maj. Symons denied that the dredge could possibly be for Buffalo and suggested that the dispatch had reference to Cleveland. Maj. Dan C. Kingman, engineer in charge of the Cleveland district, says that he has not heard directly from Gen. Gillespie regarding the transfer of the dredge to Cleveland but believes, however, that the dispatch has reference to Cleveland, because he lately submitted data showing how a government dredge could be utilized in his district. He recommended some time ago that a dredge be built for his special use and the last river and harbor bill carried an appropriation for that purpose, authorizing the secretary of war to build the dredge. It did not direct him to build it and the secretary has held the appropriation up. Maj. Kingman has urged him to use the appropriation for the specified purpose but without success. Maj. Kingman hopes now that the report that Gen. Gillespie intends to send a dredge to the lakes may be true, which hope, it is needless to say, is not shared by any of the private dredging companies.

MR. CLERGUE'S PREDICTION.

At the recent celebration in commemoration of the completion of the power canal at Sault Ste. Marie, Mr. Francis H. Clergue made a number of significant remarks. Among other things he said:

"I do not want you to think that the opening of this canal marks the end of the development of hydraulic power at the Sault. This is but the beginning. The present development is not one-quarter what the Consolidated Lake Superior Co. intends to do and what they have already planned. When the power from this canal has all been utilized we shall build another canal and still another, just so long as we can find use for the power, and if our present plans do not miscarry we shall have practically unlimited use for it. I predict that in ten years time not a ton of coal for manufacturing purposes will be used in Canada between Quebec and Hamilton. The fall of water between those two places is equal to 10,000,000 tons of coal per year."

At James Davidson's ship yard, West Bay City, work is progressing on a wooden schooner that is a duplicate of the Chieftain and also on a harbor tug. Capt. Davidson says that this is the best year in repair work that his company has had.

The first car load of steel plate to be used in the construction of the vessels to be built at the West Bay City yard of the American Ship Building Co., arrived there last week. Five vessels are to be built at this yard to be delivered by November, 1903.

MANITOWOC DRY DOCK CO.

Chicago, Nov. 5.—Officials of the Manitowoc Dry Dock Co. of this city, who recently purchased the works of Burger & Burger at Manitowoc and the works of Johnson, Knud Son & Co. in this city, are simply trying for the present to secure as much repair work as possible, but their plans contemplate extensive improvements, both here and at Manitowoc, and they will shortly be looking for new ships to build. Officials of the company are: Elias Gunnell, president; Thos. J. Prindeville, vice-president; L. E. Gear, secretary and treasurer; Chas. C. West, manager. A circular recently issued by the company is as follows:

"The Manitowoc yard has for many years made a specialty of wooden construction and repair work, and enjoys the reputation of being one of the most satisfactory and economical establishments on the chain of lakes. This is due to the fact that the yard commands one of the lowest-priced and most efficient labor markets on the great lakes. Steel working tools are being rapidly installed and skilled mechanics have been obtained, so that the company is now prepared to capably execute ship repair work of any character. Mr. George Burger will remain with the company as superintendent, and former patrons are assured that there will be no change in the established policy of the yard. The plant is equipped with a good dry dock, 340-ft. long.

"Our Chicago works are located on the north branch of the Chicago river and will be equipped with a modern floating dry dock. Recent extensive additions to the equipment of the yard will permit of the execution of any kind of above-water repairs on large tonnage and the docking of smaller craft. A work launch has been built, which will furnish a convenient service for the delivery of men and materials to vessels requiring repairs."

NEW RAILWAY TO LAKE ERIE.

In iron and steel circles there is considerable talk of a new railway, and even two of them, from Pittsburg to Lake Erie, but nothing of a definite nature is known of either project. The reports are quite generally credited, however, for the simple reason that there is sufficient traffic to make another railway, and possibly two railways, pay. Naturally, however, in undertakings of this character, the projectors do not court publicity until their plans are well matured. The first railway is one in which Jones & Laughlins were originally said to be interested. This railway will be known as the Pittsburg, Niles & Western, and it is understood that surveys have already been made for it. It will cost approximately $15,000,000. The road is intended to strike Lake Erie at Elk harbor and will be so constructed as to avoid grades. Elk harbor is 12 miles east of Conneaut harbor. The tracks of the Lake Shore, Nickel Plate, Erie & Pittsburg and Pennsylvania all practically converge there, or within a mile of it. It has also been said that the Pennsylvania company is interested in a new road in this same vicinity. The other railway is said to be projected by the Mellons in conjunction with the Crucible Steel Co., with plant at Clairton, and the Union Steel Co. with furnaces at Donora. The purchase of Chestnut grove at Geneva is not regarded as possessing any industrial significance.

A GREAT RECORD IN ORE SHIPMENTS.

Full twenty-six millions this year as against twenty millions in 1901 will be the record of lake ore shipments—and the tons are gross tons of 2,240 lbs. This is an enormous gain in a single year, and still the condition of the steel and iron industry is such that the furnace owners are demanding of the iron ore companies the last pound for which they gave orders.

The twenty-six million figure, which may be exceeded, is based upon official reports of the output to Nov. 1. These reports show shipments of 24,020,036 tons to Nov. 1 of this year, compared with 18,143,573 tons on the same date a year ago. The October shipments were much larger than was expected. They aggregated 3,311,426 tons, as against 2,986,468 tons during October, 1901.

CAPT. EBER B. WARD.

Editor Marine Review:—I was interested in the Peter White articles and also the recent review of the Ward family by Eber B. Ward. This gentleman deserves more credit than his interview implies. My first recollection of Capt. Eber B. Ward was his connection with the smart river steamer Ruby, plying on the Detroit-Port Huron run. Capt. Eber was manager, Christopher Moore master, John Strachan chief engineer, and all interested in the ownership. J. W. Thompson, Sr., (now in southern California), so well known for his long service with the Anchor Line as agent, was purser of the Ruby and later her local agent at Port Huron. The steamer laid over at Port Huron Sundays. When opportunity afforded Capt. Chris. Moore would pick up a vessel or two going through the rivers and be back at Port Huron to start on his regular run Monday morning. The Ruby was successfully and profitably managed. Her net earnings enabled Capt. Eber Ward and John Strachan to build the side-wheel steamer Susan Ward, utilizing the Ruby's engine. The Ward's starting point was Detroit. The then growing and prosperous shore of Lake Huron between Port Huron and Port Austin was taken in by the vessel on her way to the Saginaw country, which at that time was in the early stages of development. There were no railroads. Some business was done by overland teaming, but the water route was used mainly for transportation. Capt. Eber B. Ward was the moving spirit in causing construction of the walking-beam steamer Keweenaw, an unusually successful and profitable ship which was used for many years on Detroit-Lake Superior waters. The screw steamers Colburne, St. Paul, S. F. Hodge, Phil Sheridan, Annie Craig, W. H. Stevens and Northerner were all built and operated under Eber B. Ward's direction. Capt. Ward contributed in a large way to build up a substantial trade, first between Port Huron and Detroit and then by pioneering into the new Saginaw country. Lastly he aided in the development of the Lake Superior region. Capt. Ward was never mercenary. He was always genial and kindly disposed and in his treatment of young men he was especially encouraging and helpful. The writer is somewhat familiar with his attitude towards those who were long in his employ. Both employer and employe had confidence each in the other. Capt. Ward always wanted it plainly understood that he was a friend as well as employer. With all Capt. Eber's mildness he had the courage to resent an insult or imposition.

I am pleased to have had a long acquaintance and business relations with so genial a gentleman as Capt. Eber B. Ward. When his passage is ended posterity, especially those of his own state and of his home city, Detroit, will more fully and generally recognize the progressiveness and worth of the remaining member of the Ward family.

A. N. MOFFAT.

San Francisco, Oct. 30.

AROUND THE GREAT LAKES.

A new life-saving station at Racine, Wis., plans for which have been practically finished, will be very complete in every respect and will embody the latest equipment for the handling of life-saving apparatus.

The steamer City of Baltimore has been purchased by the People's Ferry Co. of Detroit and will be operated as a ferry across the Detroit river. During the present season the vessel has operated between Saginaw and Point Lookout.

The new car ferry Pere Marquette has left Cleveland for Ludington in command of Capt. Peter Kilty, Supt. Mercereaux of the Pere Marquette Railway Co. and Mr. Robert Logan of Cleveland, who designed the car ferry, made the trip. Everything worked smoothly on the new steamer's trial trip.

It is said that a new slip will be dredged at Conneaut early next spring to accommodate the new coal company, recently organized at Pittsburg, which will utilize that port for shipments of coal to the upper lakes. It is understood that the slip will be fitted with car dumps sufficient to handle an enormous traffic.

A dispatch from Montreal says that the Great Lakes & St. Lawrence River Transportation Co., known as the Wolvin syndicate, has bought from King Bros., Quebec, the entire Matane estate, with its extensive forests, for the purpose of entering into the lumber business in connection with its grain transportation interests.

The large package freight steamer for which the Western Transit Co. of Buffalo closed a contract a few days ago with the American Ship Building Co. is to be built at the Chicago yard. This steamer is to be a duplicate of the Buffalo, built not long ago for the same company, and which is one of the largest and finest package freighters on the lakes.

Following the announcement of the Cleveland-Cliffs Iron Co.'s lease of the Barasa mine at Negaunee, comes word that the company has further augmented its ore supply by securing a lease of the Escanaba River Land & Iron Co.'s holdings of about 400 acres in the vicinity of Swanzey. The option gives the right of purchase at a price approximating $200,000.

Wrecking Master Harris W. Baker has returned to Detroit with the tug Champion and barge Monitor from the wreck of the schooner John Miner which went on the rocks off Point Aux Barques two weeks ago. She had on board 280,000 ft. of lumber, of which the wrecker succeeded in saving 100,000 ft. Capt. Baker says that the vessel is a total loss.

The lighthouse tender Haze will leave Buffalo about Nov. 15 for the purpose of taking up the buoys in Lake Erie and the Detroit river. The buoys at Dunkirk will be taken up about Nov. 15; the buoys at Erie will be taken up about Nov. 16; those at Sandusky and the islands about Nov. 20, and in Maumee bay about Nov. 25; buoys in Detroit river, excepting the gas buoys, about Nov. 30. The gas buoys and light vessels in the Detroit river will be left in position as late as circumstances will permit, probably until about Dec. 10. The position of the Bar point lightship after its removal will be marked by a black spar buoy

According to a statement made by Capt. A. B. Davis, the oldest officer of the revenue cutter service on the great lakes, the revenue cutter Morrill will be sent to Cleveland next spring. The new revenue cutter Tuscarora, recently completed at the Wm. R. Trigg ship yard, Richmond, Va., will have its headquarters at Milwaukee. The Mackinac will be assigned to permanent duty patrolling the St. Mary's river and will be occasionally assisted by the Tuscarora. The Lake Carriers' Association has always desired to have St. Mary's river thoroughly patroled in order that the channels might not become choked by traffic.

MR CARNEGIE'S RECTORIAL ADDRESS

Mr. Andrew Carnegie delivered a rectorial address at St. Andrews university, St. Andrews, Scotland, lately, which is of especial interest to Americans. The address is a very long one but it has been printed in full in the World's Work. The subject was "Europe vs. America," which was treated in Mr. Carnegie's usually entertaining manner. The address is too long to be given in its entirety, but the following condensation embraces its most salient features:

"Britain alone among European nations holds in reserve an important home market capable of yielding profit equal to at least one-third or more of all her present export trade, since home commerce is doubly profitable. Here lies an untouched mine of wealth. She has in her unrivaled supply of coal, as far as Europe is concerned, another mine of vast wealth. There is one dark cloud upon her horizon which cannot be ignored. From the best information I can obtain, in twenty or twenty-five years the supply of Cleveland ironstone will be practically exhausted at the present rate of production, except that two concerns will then still have sufficient for some years longer. The Cumberland supply is already nearly exhausted. This will bring dearer iron and steel. Without cheap iron and steel the construction of ships and machinery of all kinds, and of the thousand and one articles on which steel is the base, would tend to decrease; but the loss in this trade may be compensated for by increase in other branches, caused by the ever growing wants of the world. Britain is not alone concerned in the ironstone supply, for, as far as I know, the supply is soon to become precarious in some of the other manufacturing nations before many decades pass unless new sources of supply are discovered. Even the United States has a proved supply of first-class ore only for sixty to seventy years, and a reserve of inferior grades which may keep her supplied for thirty years longer, say for a century in all, unless the rate of consumption be greatly increased. The enormous extent of territory in the republic over which ore can hopefully be looked for encourages the belief that new deposits are sure to be found. It is upon new discoveries that Britain depends, the outlook in her case being less hopeful. Germany has today, as far as proved, the most enduring supply, although its ore is not nearly so rich as the American.

"We hear of huge industrial combinations on land and sea, but the combination of forty-five states, some of them larger than the United Kingdom, forming the American union, which promises soon to equal Europe in the production of many of the staple articles, and is already producing more than the rest of the world of the article of prime importance, is a portent of infinitely more consequence to the world than any possible industrial combinations, the latter being trifling in comparison. At the present rate of progress America will, in the lifetime of many present, have a population equal to that of Europe today, excluding Russia.

"Since his continent has less than thirty people per square mile, the American has a constantly expanding home demand urging him to extensions and justifying costly improvements and the adoption of new processes. He has also a continent under one government. He establishes his several works at the centers of the various markets. If a needed ingredient be found in one state, another somewhere else, if it be desirable to construct works for one part of a process here or there, or ply ships, or build railroads in any part of this broad area, he proceeds without hesitation, dreading neither interference with supplies, hostile legislation, nor national antipathies. 'No pent up Utica contracts his powers.' More, the boundless continent is his, as are all its markets, free from tariff. His operations are free from start to finish.

"The result is that every process of manufacture in the union flows naturally to the localities best adapted for it, there being no barriers to free selection. The best places also are selected for assembling materials, raw or partially prepared, for their final forms. In short, there is free, unrestricted trade in everything under the same conditions, same laws, same flag, and free markets everywhere over an expanding continent—advantages which only those experienced in industrial trade will estimate at their full value. The European manufacturer finds obstacles to such varied expansion in a continent divided into hostile and warring states, with different laws and exactions and tariffs at every boundary, the fear of war overhanging all. He is almost compelled to confine his investments and works to the small area of his own country and its small home market. One of the many telling advantages which industrialism receives from political union in America is that a great home demand for any article from one united people occupying a continent evolves standard forms, the evolution of the best types, which justifies the manufacturer in erecting special machinery and running it exclusively upon each part of the type. Railway, electric, harbor, bridge—engineers in these and other branches adopt the standard forms; hence whenever a huge bridge, for instance, is needed promptly in any part of the world—Egypt or India—America is applied to. The steel maker has his bridge construction and bridge erecting departments managed by specialists who know what is best much better than any general engineer possibly can. The proper plans for the standard bridge required are taken and the work begins instantly. Note here that the steel maker is also the bridge contractor—a vital point. The bridge is probably open for traffic before the European engineer could have submitted plans and the bridge maker had contracted with the steel maker. A new bridge in Europe is a new creation in which several separate contractors have participated. In America it is from standard patterns evolved from experience and completed from start to finish by one contractor.

"In greater or less degree this exists in the manufacture of the principal articles of which America is now the greatest producer. Consider agricultural machinery. One of the leading English manufacturers once told me that he had been compelled to abandon foreign markets and finally to cease business. The American manufacturer had triumphed. While here 300 or 400 machines were sufficient for the season's demand, his friend in America put in hand 7,000. Megalomania again. This output justified the automatic machinery used in every process of manufacture. If my memory be correct, it was twenty-two men in Britain for two men in America for one of these processes—that is, the machinery did twenty men's work. Why, then, not adopt it in Britain, you say. Small home demand is the adequate reply, and that demand itself open to the American competitor.

"Here is an illustration of different character. The republic has now more than 10,000 miles of connected river and lake navigation which supplies the cheapest inland transportation of materials in the world. Having one government, these lakes and rivers were easily improved and joined, harbors deepened, and rivers rendered navigable by means of movable dams and locks. The work still goes steadily on under government naval and military engineers. Some years £12,000,000 have been devoted to it. In one day recently 226 barges, containing 200,000 tons of coal, passed through the Ohio river lock at Pittsburg for western and southern cities. All articles can be thus floated or towed to points 3,000 and even 4,000 miles distant for a few shillings per ton.

"The ironstone from Lake Superior mines is transported over part of this water system to the coal of Pennsylvania for 900 miles at a cost of two shillings per ton—one of several elements in the making of cheap steel. So much for water transportation through the action of government. Now consider land transportation by railroad through private agency. There is free trade in railroad building. Five men in Pennsylvania, for instance, can meet and organize a company under the general railroad law by satisfying the county court that it is a *bona fide* enterprise, and that the capital is subscribed and one-tenth paid in: a charter issues costing eight shillings and the work begins. Railway traffic rates per mile do not average over one-half, sometimes one-third, those of Europe for long distances. Often for 3,000 miles merchandise is carried by rail in bulk, without transfer, at rates that would surprise you.

"Let us go to Germany for another proof that magnitude tells. She is supreme in speed upon the Atlantic; no steamships like hers. And why? Because these monster ships start from Germany after draining the passenger travel of northern and eastern Europe. Not content with this, they touch at Southampton and compete for British travel, and still unsatisfied cross to Cherbourg and drain France and southern Europe. On their homeward trips from New York they are filled with passengers for all these ports. It is not subsidies which enable the Germans to conquer here, for their lines are not paid more than half what British lines on the Atlantic receive. It is magnitude. The 250,000,000 people the German lines serve is equivalent to a great home demand. This justifies their ocean greyhounds as the American market justifies unequaled manufacturing establishments. Since these lines were penned strong proof has come of the law of surplus. The Britain, the smaller market, has been compelled to pay $150,000 per year for two Atlantic greyhounds, while the greater market, Germany, has four of these supported by the greater demand of the greater market.

"Germany, in herself, furnishes proof of the necessity in this age for consolidation of small areas. As long as she was cut up into petty divisions, with different laws and tariffs, she had no international position industrially—it was impossible she could have. United into one empire, with free trade over the whole area, giving a home market of 56,000,000 people, she only needed to encourage the development of her resources, which was wise statesmanship, to become the dangerous rival of Britain, and even to outstrip her in the most important article of all—steel.

"One more illustration. Switzerland was the land of watch manufacture by hand. America introduced machinery, having an enormous home demand, there being scarcely an American adult without a watch. Now one concern there makes more watches than all of Switzerland, as one American constructor makes more locomotives than any European country, and one agricultural implement maker makes more machines than all Britain.

"Another proof of the value of home demand can be given from Britain. One important department in Europe is unequaled by the American—ship building, which also obeys the law of great home demand. Since Britain has been the great exporter and importer of the world and the greatest naval power, naturally the building of ships has taken firm root there, and in the world's market she remains supreme. Having the enormous home demand she conquers the foreign. More and more clearly must the truth be realized that the industrial struggle among the nations is bound up with the political, the question of magnitude being at the bottom of supremacy in both. A nation cannot be small in size and in population and remain great in material products or material power. To maintain first rank industrially, commercially or financially, small nations must merge with others

and become prosperous parts of one great federated power. Once the race was between separate nations; henceforth it is between continents.

"Ask yourself this question: If America had been composed of petty, independent, jealous states, as Europe is, each afraid of the other, and armed to the teeth against expected attacks, and had erected tariff barriers against the products of each other, would Europe ever have heard of the American industrial invasion? To ask the question is to answer it—never.

The deepest and most powerful of all contrasts between the two is that the one continent is one harmonious, peaceful, cooperative whole, its power and energy directed to industrial progress; the other divided into hostile camps—the power and energy of each directed to military protection and commercial isolation.

Ask yourselves another question: Can Europe, as long as she remains divided into hostile camps, ever hope to conquer foreign markets or even to repel the American invasion? That question also answers itself—never."

OLDEST STEAMBOAT COMPANY.

Mr. Mason L. Weems Williams writes the Marine Review saying that a mistake has been made in the claim that the steamboat line between Bangor and Boston is the oldest in point of continuous service in America. He sends a short history of the Weems Steamboat Co. of Baltimore, which has since 1817 been continuously owned and managed by descendents of the founders. The story of this line is as follows:

In 1817, ten years after Fulton had succeeded in propelling a boat on the Hudson by steam power, the Weems Line was established by George Weems, who chartered the steamer Surprise to run between Baltimore, the Patuxent river and landings on the Chesapeake bay. She continued to run until 1821 when the Eagle was bought. This steamer was built in one of the eastern cities and came around to Baltimore by sea, it being the second steamer that ever ventured out into the ocean. She was 130-ft. long and 22-ft. wide. She had a mast forward with sails, which were spread when the wind was fair to increase her speed. There was no upper deck, but in warm weather an awning was stretched over the quarter-deck, which, in the fall of the year, was taken down. She had no pilot house. The ladies' cabin was fitted with berths and was located in the stern of the boat. Between it and the engine was the dining room, around which were berths on which the men slept when meals were not being served. When these steamers were built it was not known that the engine could be made to back. It was found necessary, therefore, to stop the engine a long distance from the landing point. Sometimes the distance was miscalculated and the steamer crashed against the wharf with violent force. The people used to assemble in large numbers on the wharves to see the boat approach and frequently the old captain would stand out on the bow and warn them to get out of the way, that the boat was coming and could not be stopped in time to prevent an accident. It was by an accident that it was afterwards found that the engine would work backward as well as forward. Another difficulty was the absence of bells on the boat—no way of communicating with the engineer except by calling to him.

The Eagle continued to run until 1824 when her boiler exploded while she was lying in the harbor at Annapolis. By this accident Capt. Weems not only lost almost everything that he had but was himself so seriously hurt that for a long time he was confined to his room unable to attend to any business. This accident caused the death of one of the passengers, who was the only passenger ever killed and with one exception the only one injured since the line was established.

Having recovered from his injury, Capt. Weems organized a company which built the Patuxent in 1827. This steamer was regarded at that time as a floating palace—far superior to anything that had been seen in these waters. In his newspaper advertisement of the schedule the captain said that "a first rate cook and active obliging attendants had been selected with great caution by him, and he hoped by these attractions and by his unremitting attention, aided by a sumptuous table, to merit and obtain for the boat a full share of public patronage."

In 1828 the Patuxent started to run to Fredericksburg and landings on the Rappahannock river, calling on her way at Herring bay and landings on the lower part of the Patuxent river. For some time she continued to run this route, but afterwards the Rappahannock river was abandoned and she ran on the Patuxent alone and continued to do so until 1845, when the Planter was built to take her place and the Patuxent sold.

In 1854 the Mary Washington was purchased. Afterwards the steamers George Weems and Matilda were built. Capt. George Weems died in 1852 but long before his death had given up the entire management of his boats to his four sons, who were engaged as engineers and captains upon them until the war broke out in 1861, when the boats were seized by the government and used as transports. After the war was over the route to the Rappahannock river and Fredericksburg was resumed. The last surviving brother was Mason L. Weems, the oldest one, who died in 1874, at which time the present management took charge. The fleet now consists of nine steamers which ply between Baltimore, the Potomac, the Rappahannock and the Patuxent rivers, and also between Norfolk and the Rappahannock.

NAVIGATING THE AMAZON ABOVE IQUITOS.

The October number of the Marine Rundschau contains a narrative, compiled from the log of the German steamer Falke, respecting a voyage made by that vessel last spring on the river Amazon above Iquitos. The German government considered it advisable after the settlement of the Venezueland question that the flag of the empire should be shown on the great rivers of South America, and consequently the Falke while lying at La Guayra last February, received orders to proceed to Port of Spain and hold herself in readiness to make a voyage up the Amazon. She started on her voyage on March 8, and on the 15th sighted the Atalaja lighthouse at the mouth of the Para river, and there a pilot was taken on board, it being unsafe to enter the Para without one. The river Para is called after the city of that name; it is not really a mouth of the Amazon, but it is the most convenient entrance into it. The numerous mouths of the great river are situated further north, and are not deep enough for large vessels, while for smaller ones they are dangerous on account of the "Pararoca," a sort of tidal-wave similar to that which appears at the mouth of the Seine and other rivers. The Falke caught the flood tide, running at about 4 knots, and reached Para easily, bringing up 1½ sea miles from the town in 30 ft. of water. It had already become evident that the charts on board were useless, and that a pilot's assistance was indispensable. This difficulty had been foreseen, and negotiations had taken place beforehand with the steamship companies running boats on the Amazon, and also with private persons, for getting over it. But it turned out that the steamers going up to Manaos used the same American charts as those on board the Falke—if charts they could be called; they were mere sketches; and for the river above Manaos, no such thing as a printed chart existed. That is, unless the Booth Line captains might have some; but owing to the competition (now suppressed) then existing between that line and the Hamburg-American Line, this could not be ascertained. Anyhow, the Falke had to be content with a chart pencilled out by a German captain, who had once run a boat up the river. This, being a "unique" article, had to be hired at the cost of 1,000 marks. The cost was not grudged, however, under the special circumstances, and the Falke got up to Iquitos safely, which place had never before been reached by a vessel of anything like her draught.

Among the most interesting details of the voyage may be mentioned that Para roads (part of the Para river), are rather narrow, but vessels of 21-ft. draught can get there at all times. They have, however, to lie about 1½ miles from the landing-stairs, and the rapid current (about 4 knots at both ebb and flow) is a great hindrance to boat traffic. One great difficulty was the obtaining of bunker coals. They are to be got at Para and also at Manaos, but at Iquitos, which is reached with nearly empty bunkers, after contending for a stretch of 1,400 sea miles with a 4-knot current, hardly any coal is to be obtained. The Falke overcame this difficulty by purchasing a quantity which happened to arrive at the right moment for Messrs. Booth & Co. The price paid was $20 per ton (which was considered moderate under the circumstances), but the sale was coupled with the condition that the Falke should obtain her coal at the other two ports from the same firm, but at a lower price. If the aforesaid cargo had not arrived at Iquitos as it did, the only terms on which coal could have been got at that time was at the price of $45 per ton. This enormous price is accounted for by the fact that the other firms at Iquitos, having no steamship service of their own at Para, only get their coal by having it towed up the rapid stream in barges by a chartered steamer—a costly and risky process. The river pilots are the subject of some rather sarcastic remarks. Instead of being rough and weather-beaten sea-dogs, the captain of the Falke found them to be more like "stiffly starched and dressed-up barbers' apprentices." However, they performed their duties effectively, although they were entirely ignorant of the use of the compass. Their fees are high. Two picked men were obtained through the consul at Para, and for the run to Iquitos and back, covering nearly two months, they received (together) about 8,000 marks, ($2,000) in fees and a liberal gratuity for safe return. The Hamburg-American Line and Booth Line, also pay heavy pilotage fees; the German Company, indeed, maintains a number of pilots under contract, each of whom receives a monthly salary of about 1,000 marks ($250). This appears to be inevitable, navigation through the channels between the numerous islands being risky, and landmarks being conspicuous by their absence for a stretch (Para to Iquitos) of 2,400 miles. Neither are there any leading lights as we in Europe understand them, but at certain dangerous spots people dwelling in huts are bound to exhibit a light in their windows. This duty, however, is often shirked, and could not possibly be of much use if religiously performed. The difference between high and low water in the upper reaches of the Amazon is about 23 ft., and it very seldom varies. The Falke never found less than 26 ft. of water in the channel navigated whenever she took soundings, but this fact is attributed to the skilful pilotage. Want of water, it appears, is not the great danger to be apprehended, but the numerous trunks of trees floating on the river, some of them veritable giants of the forests, and sometimes filling the navigable channels, are a serious hindrance and a real danger, and many a merchant steamer, especially if lightly laden, has lost one or two propeller blades by striking against these obstructions. The foregoing is a much condensed summary of the Falke's log, the full reading of which is very interesting.

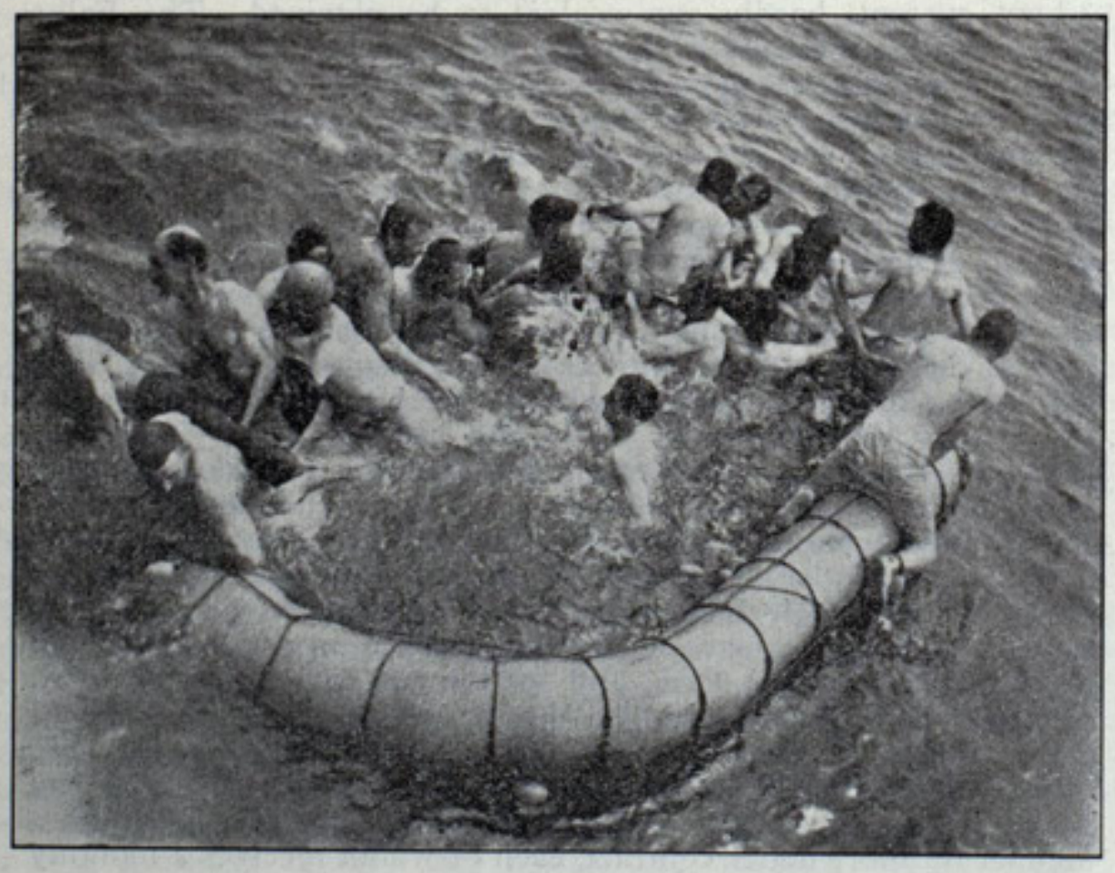
CARLEY LIFE FLOAT FACTORY COMPLETED.

After more than two months' work, the factory of the Carley Life Float Co. at Cambridgeport, Mass., has been completed. Extensive alterations to the building now makes it possible for the company to fill its orders with facility. A recent test made in New York harbor of this device, which is the invention of an old sailor, Horace Carley, proved highlv satisfactory. Since this exhibition a month ago, the company reports that many orders have been received for the appliance from representatives of steamship lines, yachtsmen and the merchant marine. Yachtsmen particularly are interested in the Carley float. Several well known yachts that are going south this winter will be equipped with them and orders have already been received for a number of others to be delivered early in the spring.

The Float in Still Water.

The float used for the exhibition referred to was one of the smallest sizes made by the company. It was 8 ft. long and 5 ft. broad and weighed 260 lbs. It was designed to hold fifteen people, and two men easily lifted it from its position on deck and tossed it overboard. Then eighteen swimmers, whose aggregate weight was in the vicinitv of 3,000 lbs., jumped overboard, swam to the device and climbed into it. The illustration shows them trying to capsize it, which they found impossible to do. In order to further test it the company is preparing for another exhibition of the float through the surf off Nantucket. The demonstration will be made during a heavy storm and the device, weighted down with some 3,000 lbs. of lead, will be sent adrift from the lightship and allowed to drift in shore. The dangerous nature of Nantucket shoals and the enormous seas that comb over the sand bars with almost irresistible force will make this test one of the most severe that can be devised, and the action of the float under such a test will be watched with much interest.

The float consists of a copper tube with many air-tight compartments strengthened by flanges. This tube is covered by 2 in. of compressed cork and wound with canvas, which in turn is treated with a non-corrosive waterproof paint, or cement, in order that it be absolutely waterproof. It is eliptical in shape,



Trying to Capsize the Float.

and its buoyancy is said by its manufacturers to greatly exceed that of any other life-saving appliance ever placed on the market. Attached to this eliptical cvlinder is a rope netting, 3 ft. deep from which is suspended a slatted wooden bottom which travels on rings inside the lashings. A feature of this float is that it is constructed in such a manner that no matter which side falls uppermost on the water, the bottom falls through and is in its proper relation to the buoyant cylinder, making the float right-side up at all times. Oars and signal flags are lashed to the sides while a breaker of water and boxes of food can be made fast on the tube. It is said to be non-sinkable, non-collapsible and non-capsizable.

Commenting upon it after the exhibition, Capt. Kilgore, the supervising inspector of anchorages of the port of New York, who has spent many years at sea in the revenue cutter service, both on the Atlantic and Pacific coast, as well as in the arctic regions, said: "That is the best and most effective life-saving appliance I have ever seen in all my experience. If it became necessary to abandon a ship, the Carley life float would doubtless save many lives. Passengers even when panic stricken would jump to reach these floats and could be transferred to lifeboats much more easily than if an attempt was made to lower a life boat over the side of a rolling vessel. I believe that we cannot have too many nor too perfect life-saving appliances and heartily endorse this as absolutely the best device of its kind that has ever been presented to my notice."

The test was a thorough one, and while the combined weight of the eighteen men caused the device to sink until but a small portion of the cylinder remained above the surface, it showed conclusively that it would bear up that aggregate weight for an indefinite period, sufficiently to save tnat number of lives, even in the roughest sea. One marine expert said that in his opinion it would sustain the weight of as many more clinging to the life lines that floated out on all sides of the device. During the test, the men attempted to capsize the float by all clinging to one side of it. This was proved to be impossible and their combined weight pressed that side of the float but a trifle under the surface.

The Carley float has been endorsed by the United States naval bureau of construction, United States supervising board of steamboat inspectors, the Canadian department of marine and fisheries and other government organizations that are interested in saving life in emergency. It is on board battleships and transports in the United States service, as well as on steamship lines and many representative yachts throughout the world. A feature of the report of the board of steamboat inspectors is that after thoroughly testing its capacity and buoyancy, they have allowed it a much greater buovancy than any other life-saving device. It is represented to be also the only apparatus that possesses, in addition to the buoyancy required by law, the capacity in feet for carrying persons whose aggregate weight is equivalent to the buoyancy claimed.

ITEMS OF GENERAL INTEREST.

The object in view in raising the capital of the Chinese Coast Navigation Co. of Hamburg, to 5,000,000 marks, is the acquisition of five or six new steamers of 2,000 to 3,000 tons capacity each.

The British government has issued a decree to the effect that all steamers navigating the Amazon must in future use searchlights in order to prevent collisions. This decree will affect about 500 steamers.

The H. C. Frick Coke Co. will abolish all selling agencies on Dec. 31 and will convey its coke supply to the United States Steel Corporation exclusively. In other words, the Frick company, which is one of the underlying companies of the Steel Corporation, withdraws entirely from the outside market. It recently fixed the price of coke at $3 per ton.

Honolulu is soon to have a new line of steamers if official reports received by the French consul can be taken as conclusive. The steamers of the Messageries Maritimes, now sailing from Marseilles to Sydney, are next month to make Honolulu and will include also New Caledonia, Tahiti and San Francisco in their itinerary. At present there are three or four passenger lines stopping at Hawaii but as they are in a practical combination shippers believe that freights have been kept at high water mark. It is understood that the people of Hawaii welcome the coming of the new line.

The lake submarine torpedo boat Protector was successfully launched at Bridgeport, Conn., last Saturday in the presence of representatives of several governments and the naval attaches at Washington. The Protector is designed for harbor defense. She is 60 ft. long, 11-ft. beam, and has a displacement of 65 tons. She has running gear to enable her to travel on the bottom of the sea. Her motive power is electricity when submerged and gasoline when traveling awash. A trap door in her bow will permit a diver to leave the boat and cut cables or mine connections, and her builders believe that she can destroy the submarine defense of any harbor in the world.

The Atlantic Transport Co., one of the subsidiary companies of the International Mercantile Marine Co., has placed orders, it is understood, with Harland & Wolff, Belfast, Ireland, for three 13,000-ton vessels to be named Minnehakta, Minnewaska and Minnelowna. This firm of ship builders has now under construction and under repair vessels aggregating 300,000 tons. The Cedric, the largest liner afloat, is receiving her finishing touches, while a vessel to exceed her in dimensions is now being laid down. It is whispered also that the shipping combination is considering the advisability of building two greyhounds to rival the two which the Cunard company is building with governmental aid.

An arrangement has been concluded between the Austrian government and the Austrian Lloyd with references to the voyages which that company will undertake next year with state assistance. Among others three voyages to Persia are fixed upon, for which a subsidy of 75,000 kronen will be granted. Five vovages to East Africa will also be made and a sixth if circumstances are favorable. For the Calcutta service the program is not changed—the number of voyages is to be twelve or thirteen. In connection with the trips to Kobe and Bombay the sailings are to be twentv-four. The Indian service of the Austrian Lloyd has hitherto been profitable, large cargoes of sugar having been conveyed.

THE BRITISH NAVY VIGOROUSLY ATTACKED.

The following attack upon the British navy, printed and circulated somewhat extensively throughout Germany, has created a furore in that country. Were things, indeed, half as bad as they are painted the navy would be in a bad way. The British must console themselves with the fact that it is always the tree which bears the finest fruit that has the most sticks and stones beneath it. The attack reads:

Nowadays the English navy is always held up before us as a model, and people din into our ears, with the persistence of a fixed idea, their superstitious alarm at the "overwhelming fleet of England, mistress of the seas." True, indeed, it is that she is immensely superior in ships; in that respect the "two powers system" is achieved with marked success. It is absolutely correct, and no mere exaggeration, that the English squadrons could hold their own as regards number and classes of vessels, speed, armament and crews against the allied fleets of any other two naval powers—even France and Russia—to say nothing of the triple alliance; the numerical proportion completely agrees with this. But a cool, unbiased and critical observer, if he have the nice eye of an expert, sees deeper. At the first glance he will see all sorts of things from which may God preserve our aspiring navy, which, though capable of growth, lacks development. We find excellent and powerful vessels, but, for instance, not a single ship, not even among the newest that have been built or planned, which for tactical value is comparable to the battleships of our Kaiser class; first-rate vessels which, it is significant to note, are rated so low by the English critics.

Leaving the hull and its build and the engines and boilers out of the question for the meantime, it is the German armament and its arrangements which are so superior to that of the larger and needlessly heavy ships of England which range up to 4,000 tons displacement. The German vessels discharge in their broadside as much as 25 per cent. more weight of metal than the English, and in fore and aft fighting, nowadays the most powerful and effective method, quite double as much. Among the first rate vessels of England we find gross errors in construction, which are hushed up. On board her best ships we also discover serious defects in detail, particularly in machinery and boilers, in the armament, its ammunition and working, in the navigation and manning. Mishaps in the much-lauded and admired royal navy are frequently out of all proportion. Latterly, many accidents have taken place in this model fleet, blow after blow; and have given us a deep insight into it, and revealed a state of things which recalls the sorry and deplorable condition of the Spanish navy at the outbreak of the Cuban war.

A short time ago I proved how superficially and untrustworthily trial trips are carried out; that is characteristic of all the bumptious self-glorification of the English. And the firing tests, target practice and maneuvers of this model fleet are executed, on the whole, with similar presumption. The guns, on account of insufficient testing, are often more dangerous to the men than to the targets. Catastrophes occur every day from defective manufacture of the artillery and projectiles. At the first discharge of the two 10-in. guns in the Thunderer's forward turret only small fragments of the projectile were fired, the bottom and lateral parts remaining stuck fast. These two guns are, of course, of no fighting value; and this means that the Thunderer can no longer fire ahead—the best alignment for engaging. The official account of the affair was that, owing to the heavy rolling of the vessel, water got into the muzzles of the guns and damped the charges. That's good enough—for smart English brains! Besides these mishaps there is a long sequence of accidents of the same kind, the projectiles bursting prematurely and the bore and breach of the piece being demolished and the gun squad injured. Through these accidents—leaving others out of the question—it is only natural that the indispensable reliance of the gunners on their weapons is completely shaken.

Moreover, as the navy league has proved, sixteen of the English battleships are still armed with completely obsolete muzzle-loaders, even four of the vessels held in immediate readiness for sea. Twenty-nine of the so-called battleships quoted in the admiralty list were built previous to 1890, and among these are the Bellerophon (1865), Hercules and Monarch (1868), Sultan (1870), and so on. It is true that twelve of these sea ancients were modernized between 1890 and 1895; but no right-minded authority will term them modern on that account and take them to be perfectly valid as battleships. Enough of this!

At present Great Britain has upwards of twenty-five battleships in service in home waters. If these "effective" vessels are examined in a critical spirit one is more than taken aback. Fifteen of them are obsolete. I have mentioned their armament above, and have yet to speak about their boilers. A distinguished British expert says: "In any future naval war that side will win which has the best boilers." There is a great deal of truth in that. But with what sad thoughts must this expert look forward to the fate of his country. Great Britain has been compelled to avoid naval war, and she must do so. She cannot indulge in any hope of carrying it on energetically, for very speedily most of her ships would be put out of action because of defective boilers. And English armor plates? In this matter someone must have a very bad conscience, for it is already recommended in a memorial that Krupp's 6-in. plating be supplied. The same is demonstrated with regard to electric hoists, steering apparatus and transmitters.

Now how do matters stand with regard to naval maneuvers and squadron practice? In England they seem to be convinced that this model fleet of theirs has no real need for such petty matters, which are undertaken annually just to prove this over and over again. The maneuvers are reviews, without that real earnestness which alone is of any value. When the squadrons sail around the British coasts nothing happens but a terrible quantity of yells of "Hip," banquetting, regattas and utterly futile sports; and old England is enraptured, and once more convinced of the matchlessness of her wonderful navy. Not long ago the manuevers of the Mediterranean squadron were interrupted and the ships were put about and steamed back to Gibraltar in order that officers and men might not miss a fine regatta.

To most officers in the English navy the service is but a secondary business, a task unfortunately unavoidable, if one wants repute, perhaps, and title. Let the best of them be asked whether he ever imagines himself to be an admiral-in-command in action, and whom he considers capable of handling a squadron. I verily believe, if he be an honest man, he will only shrug his shoulders. If one takes Sir John Fisher, Commander Harry Jones, Admiral Rawson and Lord Charles Beresford as leaders, where are the others? Will even these few answer the confidence reposed in them by their nation, and vindicate it when it comes to facts? Up to the present none of them has been in a position to prove it, anyhow or anywhere. And now for the supreme management, the admiralty! Is it up-to-date? Can it act as becomes its enormous importance? The former first lord, Mr. Goschen, may he also have made mistakes in his gigantic department? He was a very distinguished man to whom England owes much—at all events the numerical strength of her fleet. But his successor, Lord Selborne, son-in-law of the premier, Lord Salisbury? He is a nobleman—certainly no Chamberlain. He may have the highest capacities and bring the most honest intentions to bear; but a naval expert he is not in the least. To put such a novice into this most responsible imperial office solely from family reasons appears to me to be wholly unwarranted.

We come to the garrisons of the English navy. What of their manning? Unquestionably the personnel is much better for the service than any of the mercenary blackguards in red or in khaki recruited anyhow at a pinch. Among them, as now perhaps only among the small farmers in England, may be found some of the practical type who possess divers good points of the English character. But on the whole the men are a true reflex of their superiors—"Like master, like man." There is no talk of comparison with our men, even from the most lenient critic. They lack above all that deep moral seriousness with which our bluejackets win hearts the world over, that unselfish devotion, that firm, I might say, pious sense of duty. The exactness and method of our service are absent, and the drill which is so absolutely necessary on board ship. I am of opinion that in evil days too much reliance will not be placed on the English marine. The men are discontented, and rightly so. On the one hand they are treated arrogantly and offensively; on the other hand they are neglected. The punishments for misdemeanors are either out of date—positively horrible and degrading; corporal and such like punishments are still in use—or the culprits are allowed to escape; and that for good reasons. The victualling is still to be dealt with. The indisputable revelations of James Douglas have disclosed a state of matters wholly incredible to us. That such things really happen and are prevalent is thoroughly proved by the startling incidents of the same kind in South Africa. The famous "Whitewash" commission in London is still concerned—to no purpose—with the effacement of them. In all these circumstances it is by no means surprising if the poor devils, hungry and badly treated, often mutiny. Now how does England provide for the manning of her gigantic navy on a war footing? If Great Britain wished to mobilize her fleet she would need at least 150,000 men. This number, moreover, is only in connection with the vessels of war, without taking in the immense number of auxiliaries, tenders, transports, and so on. These men, moreover, must be trained to some extent; they should at least have some idea of things aboard ship and of the handling of guns. Where are these crews to come from? If people persuade themselves that a sufficient supply of men for the mobilized fleet is to be found in their enormous mercantile marine, if they can really bring themselves to believe that, it is only another striking proof of English bumptiousness, of incredible naivete and frivolity.

Great Britain has at her disposal over thirty-two auxiliary cruisers—great mail steamers of four subsidized lines, and steaming from 16½ to 21 knots. The subsidizing of them costs £825,000 a year, £500,000 more than the German imperial subvention. At three ports in England, and at Hong Kong and Sydney, thirty complements of guns, etc., are kept ready for their use. The value of these ships will be illusory enough, the more so since Germany, as everyone knows, can turn out a whole lot of faster steamers. But England relies greatly on her auxiliary cruisers to bring in prizes, cut off the enemy's supplies, destroy and possibly annex her commerce. Privateering is very congenial to the English nature. In the main, however, the value of the English volunteer cruisers is very doubtful, even mythical, as they will only be manned with great difficulty.

The English have sought many remedies for this state of things, but what has been done up to the present time will come

to nothing. The far-famed and no doubt useful coast guards are not nearly numerous enough; a possible 4,000 men might be got out of them—hardly more. The new naval reserve law may perhaps bring 15,000 reservists, but without a doubt it will lessen the numbers of the men enlisting for active service because of the stricter conditions of the pension. The reserves are to have long service, that is, twenty-two years. This condition is, I think, incomprehensibly inept and short-sighted, for with such a prospect many a man would decline to enter the navy. All this relates to the seamen alone; what about the stokers and engineers? How to supply the English navy for war with an adequate number of trained stokers and engineers is a riddle wholly unsolved by those at the head of affairs. A naval station ought to provide a secure harbor as a base of operations, or to enable a fleet to hide and to assemble. The vessels should there find fresh stores of coal, ammunition and provisions, and be able to effect repairs in dockyards fitted with all mechanical contrivances and provided with a sufficient supply of reserve parts and so on. But such a harbor must be a thorough shelter, protected as much as possible against the force of wind and sea, as also against a hostile coup de main. Therefore, in so far as it is not strengthened already by natural situation, it must be fortified with strong works and with modern armaments. But these obviously necessary conditions are not satisfied at most of the English naval and coaling stations. Either fortifications are entirely lacking, or the guns and gunners, even the garrisons, are altogether insufficient.

The coaling stations have for the most part an adequate supply of fuel for times of peace; but on that point also the English do not forecast the much greater demands of war. Moreover, one is continually hearing complaints of the bad condition and inferior quality of the fuel supplied, so that the proper head of steam, and therefore, the ship's best speed can be reached only with great difficulty, if at all, and can in no sense be maintained, especially with the boilers described above. Furthermore, complaints are made about reserves of ammunition, necessaries for the sick and commissariat, both in quantity and quality. From observations and experiences in South Africa there is little doubt that all these complaints are fully justified. But if all was as it ought to be, even then these most inadequately fortified stations would serve very little purpose. They are but dust in the eyes of the multitude who want to be lulled into security. Before long the majority of them are sure to fall a prey to the energetic operations of hostile squadrons, and their stores used, taken away or burned. And how are these stations provided with docks and dockyards? They are like all the other things; they are either scantily provided or not in efficient readiness; and it is strange that the most important stations in the southern hemisphere are totally lacking in these things. This is an inexplicable omission, especially on the part of the nation which calls itself seafaring before all others.

To draw a conclusion from these remarks I must say that the navy of England is just as little prepared for hostilities as the army, and that it will fail just the same; though it is certainly incomparably better than those hordes which despise everything most needed for the army of a world power and a civilized state. Compared with the disgraced commander-in-chief of the English army, its midshipmen should prove themselves strategic geniuses. But the future opponents of the British navy are such as her ships have never yet encountered, opponents with thoroughly up-to-date vessels, well armed and ready for war, and with efficiently trained crews and full reserves behind them. This brings us to the point. There is but one watchword: "Los von England." From the snowy ridges of the Bavarian Alps this word should roll down like an avalanche over mountain and valley and field until it intermingles with the roar of the ocean.

COAST LIGHTS AND SIGNALS.

With the early part of November there begins a hard fight all along the coast of the United States—a fight rarely chronicled, yet incessant and fierce. It is the fight of the coast lights and signals against storm and fog. From March to November the men caged in the slender steel and stone cylinders that stand on hidden ledges with the nearest land lying along the horizon like a dim cloud, need not fear even if storm-beset; for the summer storm does not last long, and they are sure that the relief and supply vessels will make their way to them within a few days. But when the gales of the late autumn and of the winter begin there may be a month and even more when no ship can dare to approach those foam-bordered ocean perches. Then the keepers are as besieged men. They must save every drop of oil, that their lights may be kept burning even should a new supply fail to arrive when due. They must watch their machinery every minute, for no help could reach them to repair it should it break down.

On such lighthouses as famous Minot's Ledge, off Boston harbor, rising sheer out of the sea, they are imprisoned, unable to move an inch out of their narrow tower. Minot's Ledge light stands 85 ft. high from the level of the sea. The reef on which it is set is far below the surface in any except low tides even in ordinary weather. When the ocean roars around it in a winter storm, the mariner, looking at it from the sea, often can discern only its brave lantern above the spray. The entrance to this lighthouse is half way up the tower, and an iron ladder reaches to sea level. In the winter there are days after days, and sometimes weeks, when no man could venture into that doorway. He would be carried away by the rollers that break against the base and sweep the little balcony.

But this merely physical fight is only one part of the battle that goes on in the lighthouse during the winter. There is another battle as great. It is worry and anxiety. The light keepers of the United States have been trained to look on their lights as the American soldier and sailor look on their flag. So well have they been disciplined and so well do they guard the trust that there rarely is a case of a light having failed when human energy and pluck could keep it burning. When sleet and snow drive over the towers, these men are stricken with the fear that despite all their care the light, burn it ever so brightly, may not be able to pierce the thick air. Only one who has been in a lighthouse through a great winter night's storm, can realize how keen and wearing an anxiety this is to them. Like all men who have to do with the powers of nature, they know that, though they do their best, that best is not good enough, if it is not successful.

So, blow the gales as they may, the keepers climb out on the narrow platform around the outside of the big windows that protect the precious lens, and with the weather beating them and the wind threatening to blow them into the black sea below, with waves reaching up to them, they scrape the drifted snow and the frozen sleet from the panes throughout the night that the light may shine out freely. The dimming of an ordinarily sufficient light in thick weather has troubled the lighthouse department seriously for years, during which time the engineer and naval officers on the board have experimented constantly. The result of their efforts has been the recent adoption of a lantern lens entirely different from the cylindrical one used to this time.

The new lens is known as the "bivalve," which is expressive of its appearance. Instead of a cylinder of glass revolving around the light, it consists of two immense convex discs joined at the edges by thick brass bands. The value of the bivalve lens is that each face throws an immense beam, concentrating the light rays that in the ordinary lens are dissipated by being shot to many angles. A bivalve light of the fourth order will throw a flash of 5,000 candle power from a light of only 250 candle power. Only a few of them have been installed as yet. Their cost is heavy, a third-order lens costing $12,000.

One of these bivalve lights has been installed in the famous Navesink lighthouse, overlooking Sandy Hook. Although not a first-order light, the new lens makes it one of the most powerful in the world. It throws a flash every five seconds, and the lighthouse department has a report from a sea captain, who declares that he saw the flash 75 miles at sea. If he was correct, what he saw at that distance must have been the reflection of the flash on the sky; for the Navesink tower is 246 ft. above the sea, and consequently the extreme limit at which the eye could see the light directly is only 22¼ miles, the curvature of the earth precluding any greater reach. But this light is so powerful that it is certain that its illumination of the sky and sea can be seen from a distance many miles beyond the direct reach of its rays. When 20 miles away from it, its glare is so blinding in clear weather that the eye is dazzled and pained by it.

The bivalve light, of course, must be revolved much more quickly than any cylindrical lens, and as a lens weighs from two to three tons, according to its class, the problem was a difficult one in practical mechanics, since all the lights of the country are revolved by clockwork. A system of chariot wheels mounted on beautiful steel ball bearings has been perfected now that carries these great masses of ground glass so smoothly that the touch of a finger is sufficient to set them revolving. Once, as an experiment, a mighty third-order lens was set to revolving in the lighthouse headquarters at Tompkinsville, Staten island, by a man with powerful lungs who blew at it until it turned.

Another big improvement in the efficiency of the lighthouse service is the final construction of an apparatus that will burn acetylene gas perfectly. Scores of plans have been tried only to be rejected, but now the department feels fairly certain that it has succeeded. The value of acetylene gas for coast lights does not lie in its illuminating power. Kerosene oil has been found to be the most satisfactory in all respects for all kinds of lights. But acetylene gas is of great value with the hundreds of lights that are not in the care of keepers, but are simply lighted and left burning day and night. Small lights set on bars and reefs, range lights set along shore and on hilltops, and many lesser lights in harbors and estuaries are kept going in this way. The trouble with kerosene is that after a time the wick carbonizes and the light fails before the kerosene in the reservoir is exhausted. With the new apparatus for making and burning acetylene gas there is no such trouble, and the burners will last at least as long as the gas holds out. Lights have been kept burning for sixty days and nights without needing attention.

The method cannot be applied to light buoys or other floating lights, as the proper production and government of the supply of gas demand that water shall reach the chemicals only in strictly regulated quantities. So that class of light still must continue to depend on ordinary gas and kerosene for fuel. For this purpose immense iron tanks are used. On their tops is a cage in which the lens is set. Immense chains are shackled to the bottom, and a queer cast-iron mushroom anchor holds them in position. These mushroom anchors or sinkers are so shaped that they work themselves deep into the mud or sand, and after a few weeks they cannot be dislodged, even by the huge derricks of the lighthouse tenders. When it is desired to take up buoys of this kind—

as in the winter when the ice threatens them—they are unshackled from the chains and dragged aboard, and big wooden spars are fastened to the chains to serve as marks until the danger is past.

While every year sees more or less damage to lighthouses and beacons, there is only one spot along the coast that has defied the lighthouse builders successfully, and that is Diamond shoals, off Cape Hatteras, the most dangerous place in the lighthouse service. A lighthouse engineer will get "hot in the collar" if it is suggested that this spot has defeated the department. He will say that a lighthouse can be built there and built to stay. He will point to the lighthouse that finally was constructed and has remained at the mouth of the Elbe, a worse spot than even Diamond shoals. But the question of money prevents. A lighthouse on Diamond shoals would cost too much.

So this year, as in previous years, a lightship will hang on to the bottom there with its anchors like grim death, with all on board praying that it will continue to hang on. A somewhat alarming comment on the beauty of the station is to be observed in the department's directions for the year: "Light vessels numbers 71 to 72 will be used on this station alternately." Each of these ships is fitted so that she can move under her own steam, so she will not be an absolutely helpless hulk when she breaks away from her mooring in a howling gale, as she will more than once in this coming winter.

Lightship number 69, also built to go under her own steam, was driven from her anchorage six times in four months, but managed to steam back to her position each time. The seventh time she failed. She fought against the hurricane for three days and then went up on the North Carolina beach near the Creeds Hill life station. The life-savers got her crew off. The value of the Diamond shoals lightships is shown by the fact that during this vessel's last vear on her station 2,570 steam vessels and 2,576 sailing vessels passed her.

ABOLISHING THE SMOKE NUISANCE.

The C. O. Bartlett & Snow Co. of Cleveland, claim that they have perfected and put into successful operation a system for burning soft coal which is worth the careful consideration of all users of soft coal and is of especial interest to municipalities which are afflicted with the smoke nuisance. Indeed Mr. C. O. Bartlett, president of the company, believes that the system solves the smoke problem in the cities, because he believes that with its universal adoption there would be no smoke made whatever. Briefly this result is obtained by drying and crushing the coal to powder and burning it in suspension. Without perfect combustion there must be smoke; and in order to get perfect combustion three things are absolutely necessary. These are:

First. The coal must be of uniform size. In other words it is utterly impossible to get the same results from burning a chunk of coal as big as a man's head and another piece as big as a pea. The coal must be made of even size before perfect combustion can be had.

Second. The coal must be of equal moisture; in other words the same results cannot be obtained from burning coals of different moisture. Run of mine coal containing 5 to 6 per cent. moisture will not give the same combustion as slack coal containing 10 to 12 per cent. moisture. The idea of wetting coal before putting it in the furnace or admitting steam jets under a boiler is in Mr. Bartlett's judgment nonsense.

Third: That powdered coal must be burnt in suspension. If it is swept or pushed into the furnace the heavy particles will fall to the bottom and become a solid clinker, which is very objectionable and almost impossible to get out, but by burning in suspension absolute combustion is obtained.

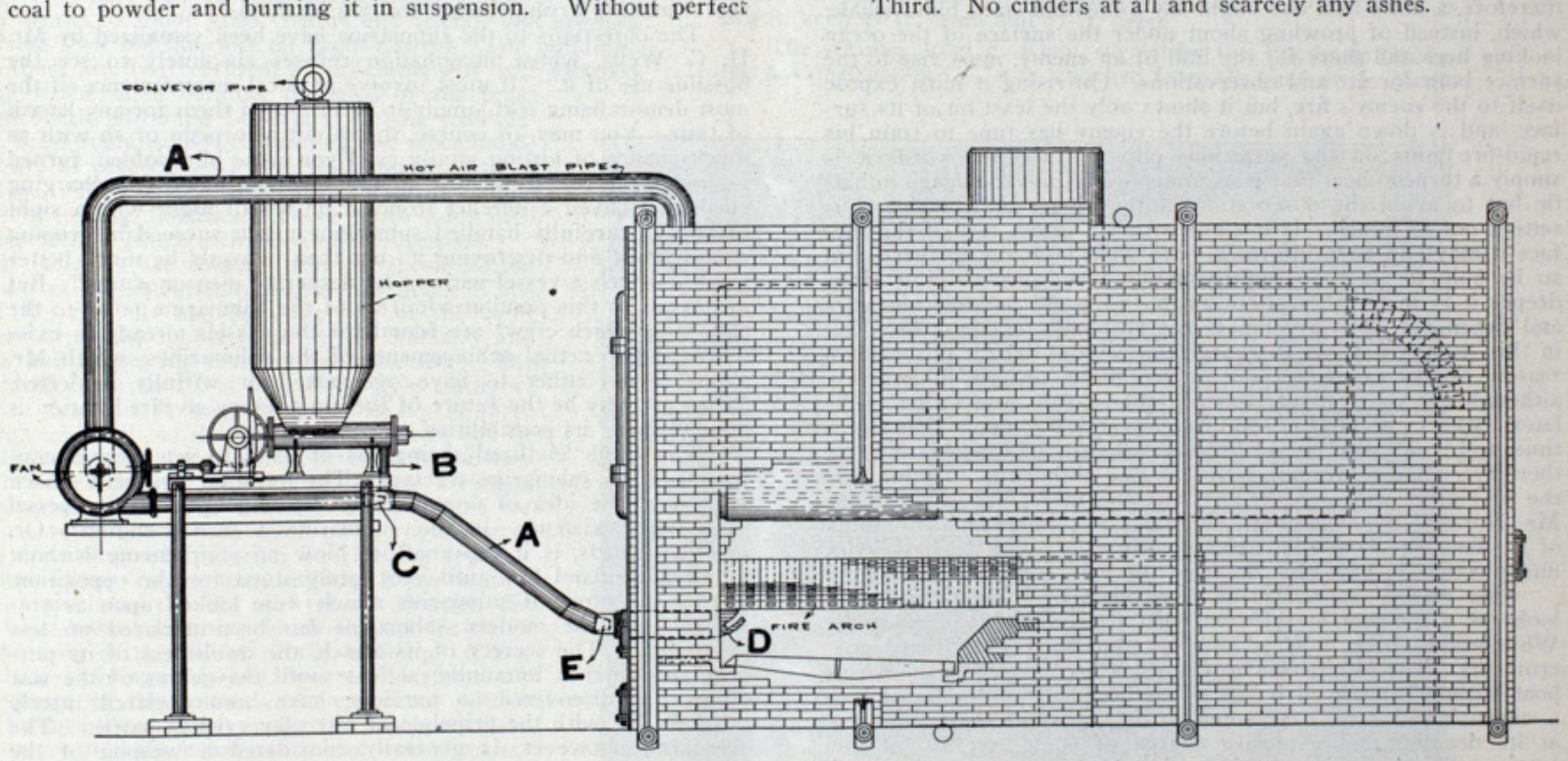
In order to obtain these three important features the C. O. Bartlett & Snow Co. has perfected, and is now using it, under the boiler at its works on the flats in Cleveland, a system whereby the coal, using the cheapest kind of slack, is dried down to 2 per cent. moisture and then ground to 80-mesh fine, which makes it practically coal dust. It is then fed to the furnace by what is known as the Rowe feeder system, which is described in the accompanying drawing. The ground coal is stored in an iron storage hopper or tank above or near the boiler. An air pipe "A" is connected with feeder spout at the furnace and above the boiler in the breeching or stack. A blower fan is attached to this pipe of sufficient size to furnish the necessary air for burning the coal dust. The operation of feeding is as follows:

The coal is conveyed by a special conveyor from the bottom of the storage bin to a spout "B." The speed of this conveyor controls the amount of coal used and can be changed at a moment's notice by turning a hand wheel, that is, to feed faster or slower according to the amount of fuel desired. From the conveyor the coal is fed direct to the air spout "A." There is a nozzle "C" on the inside of the air spout which concentrates the air just as it strikes the coal as it comes down from the conveyor which gives a thorough mixture of the coal with the air, and at the same time prevents any danger of clogging. The coal is caught by the current of air and blown along the air spout to the furnace spout. Just before entering this spout there is another nozzle "E" which again concentrates and mixes the air with the dust just before it enters the feed spout "D." This feed spout is made of cast iron and has a semi-circle opening or mouth so as to spray the coal dust up and against the arch wall, where it is ignited and burned in suspension. This spout is covered with fire brick for protection and the current of air continually passing through it also protects it from burning out. In fact there is nothing about the system which is not durable. There are slides or valves on the different places in the air pipe so as to admit just enough air to get perfect combustion, all of which are under the complete control of the operator. Mr. Bartlett says that seven things are accomplished by this system of feeding coal. These advantages are:

First. A perfect combustion; in other words there is no black smoke.

Second. A saving of 25 per cent. in the amount of coal used.

Third. No cinders at all and scarcely any ashes.



The Rowe Feeder System.

Fourth. It requires no change in the grates used under any ordinary boiler to install this system and in case of accident coal can be fed at the furnace doors the same as before.

Fifth. The supply of feed can be changed at a minute's notice by simply turning a hand wheel.

Sixth. The doors are not opened at all, thus doing away with all undue contraction and expansion caused by the admission of cold air through the furnace doors as in the old way of firing.

Seventh. No fireman is required.

Anyone who desires to see the system in operation may do so by visiting the works on the flats.

The first United States gunboat ever built in Japan has just been launched. The gunboat is one of five ordered for service in the Philippine islands. She was christened Rombion by a daughter of Admiral Robley Evans.

SUBMARINE WARFARE.

(From the Boston Evening Transcript.)

If you were asked to describe a submarine boat, would you not say that it is a craft shaped like a fish, theoretically intended to dodge wickedly about under the ocean and either, like Capt. Nemo's Nautilus, to ram an unsuspecting enemy or fasten to it a vaguely understood mechanism which would in turn explode by clockwork and blow the unsuspecting enemy straight into eternity? For this picture of the submarine Jules Verne is probably largely responsible; the boat of his imagination was able thus to dodge about under the ocean; it could stay down for long periods; it could see plainly; it was large enough for several persons to move about in with the greatest comfort and without disturbing its equilibrium; it was, in short, pretty nearly everything that the real submarine of the modern naval program is not. But such as this modern submarine is, all the great powers have adopted and are experimenting with it, and those who have expressed authoritative opinions are of three classes. One class has no faith in the creature whatever; another jumps to the opinion that it will revolutionize the seas until the sturdy merchantman will be all alone on the surface; a third class more conservative, looks at what has been done, believes that the development is bound to continue, and foresees for the submarine an important place in coast defense and even in the general naval engagements of the future. But despite their picturesque and romantic possibilities, submarines have awakened comparatively little popular interest. Until the recent publication of Mr. Herbert C. Fyfe's volume—to whom I frankly confess my indebtedness for the facts of this article—there has been no complete untechnical account in English of the past and present status of these small, mysterious and potentially deadly war vessels.

The modern submarine, shaped indeed much like a fish in the United States and British navies but more like an enormous cigar in French, is not intended to operate altogether under water. It is submersible rather than submarine; it can and does sink, but it isn't intended to stay down very long at a time. When it is down, invention has not yet found a way for it to see through the surrounding water. It does not "ram" an enemy except by accident and, so far as guiding his little vessel is concerned, the man behind the torpedo of a submarine must depend upon a mechanism by which the surface conditions of the ocean are reflected down to him, or steer by compass, not very certainly because the electrical apparatus of the vessel is always likely more or less to effect the veracity of the needle. The submarine is therefore, a blind fish, one might say a medium-sized blind whale, which, instead of prowling about under the surface of the ocean looking here and there for the hull of an enemy, must rise to the surface both for air and observations. On rising it must expose itself to the enemy's fire, but it shows only the least bit of its surface, and is down again before the enemy has time to train his rapid-fire guns on the suspicious object. In other words it is simply a torpedo boat that goes under water, not to engage in battle but to avoid the observation of the bigger craft which it is setting out to attack. If it stays within a dozen feet of the surface it may still keep informed as to what is going on there, and so be able to steer an approximately true course. If it sinks deeper it is in total darkness, unable to avoid possible obstacles and dependent upon a compass not absolutely trustworthy. But in this darkness it can discharge the torpedo which is the main reason of its existence, and it has been proved in practice, although not yet in actual warfare, that it can hit a target. The latest types of submarine can stay under water many hours at a time and can travel long distances almost submerged and are therefore, almost invisible. Nor do the authorities imagine that the submarine will ever become anything more than submersible. Mr. Nordenfelt has himself said that it is impossible "to think of a submarine boat that actually maneuvers and does its work under water. I gave that up from the very commencement."

One way to approach the mechanism of a submarine is to look for a moment at the somewhat parallel mechanism of the Whitehead torpedo, now adopted by practically all civilized governments. The Whitehead torpedo has been called a submarine boat without a crew in it; as it has been so far developed it is a cigar-shaped steel case some 14 ft. in length, and carrying, at its deadliest, an explosive charge of some 200 lbs. of gun cotton. This big cigar terminates, at the lighting end of a small one, in a propeller to send it forward and rudders that direct its course up and down as well as to one side or the other. Inside it is divided into a series of distinct compartments. In the first two are respectively the firing arrangement and the explosive chamber; in the third the compressed air that supplies the torpedo with its motive power; in the fourth the machinery—for many years a closely guarded secret—which transmits to the horizontal rudders at the end of the cigar-shaped case the adjustments necessary to keep the moving torpedo at a uniform, prearranged depth below the surface of the water; in the fifth the engine room, its motor, connected with the chamber of compressed air, driving the torpedo some 24 knots an hour toward the threatened vessel; the sixth chamber gives the torpedo its necessary buoyancy, and the seventh contains the protected mechanism of the horizontal and vertical rudders and the propeller. These torpedoes are fired from tubes by compressed air much as a giant might shoot beans out of an enormous bean blower. The act of leaving the tube sets the mechanism of the torpedo in operation, and it goes forward by the action of its own engines until it either exceeds the limit of its range or explodes by contact with some solid body. The torpedo is now almost invariably fired below the surface from the submerged tubes of a torpedo boat, and in time of war the officer in command of such a boat would discharge his almost living weapon by pressing a button in his vessel's conning tower.

The submarine is frankly an adjunct to the torpedo. Its main business in life is to get near enough to the quarry to make the torpedo doubly certain. Running with only the conning tower visible it is able to approach nearer than the larger torpedo boat with less fear of being blown out of water by the rapid-fire guns of a hostile vessel. Having sighted the quarry, it is able to plunge below the surface and approach yet nearer. Then it rises for the last time before firing, takes is final bearings and again disappears to discharge its weapon. In making the submarine practicable, it has obviously been necessary to overcome many of the problems that affect the submarine torpedo itself. Both are biggest at the head, because it has been found that a submarine vessel, like a fish, goes more easily when constructed on these lines. Both go beneath the surface by the propulsion of their engines and the direction of horizontal rudders. Both are blind when under water. But the submarine has had also to overcome the problem of longitudinal stability and to find a means of keeping on an even keel when below the surface, suspended in midwater and so delicately balanced that the loss of weight following the discharge of a torpedo was for some time thought to present an insurmountable difficulty. Under this loss of weight forward the earlier of the modern submarines reared like a startled horse and then settled stern foremost toward the bottom. But these and other problems, so far as can be judged from naval manuevers and target practice, have been so far solved that the submarine is generally admitted to have passed from being an expensive toy to the more convincing stage at which no naval power can afford to neglect it.

England, where the admiralty has for years allowed France and the United States to carry on the earlier experiments, has finally added the submarine to her own navy—partly, perhaps, as a means of discovering how to destroy the submarines of France if occasion should arise for doing so. On our own side of the water there are the Holland, Adder, Moccasin, Porpoise and Shark; the Pike and Grampus are either launched or soon to take water; the naval appropriation bill of 1902 was amended to include five more submarines of the Holland type, and other types are also to be investigated. As for Russia, it has been rumored—but apparently only as such things are rumored—that she is making arrangements for 300 of them.

The objections to the submarine have been visualized by Mr. H. G. Wells, whose imagination refuses absolutely to see the possible use of it. "It must involve physical inconvenience of the most demoralizing sort simply to be in one of them for any length of time. You may, of course, throw out a torpedo or so with as much chance of hitting vitally as if you were blindfolded, turned around three times and told to fire revolver shots at a charging elephant. Given a derelict ironclad on a still night within sight of land, a carefully handled submarine might succeed in groping its way to it and destroying it; but then it would be much better to attack such a vessel with a few desperate men on a tug." But in answer to this opinion admirers of the submarine point to the ease with which crews are found for the vessels already in existence, and to actual achievements of the submarines, which Mr. Wells seems either to have overlooked or wilfully neglected. Whatever may be the future of the craft, every civilized nation is now studying its possibilities.

The word "civilized" brings us of itself to yet another consideration of submarine warfare. The question has been raised ever since the idea of unexpectedly blowing up a hostile vessel came into existence—Is the submarine a moral engine? Or, in other words, is it legitimate to blow up your enemy without notice? England has until very lately stood for the opposition. Earlier inventors of submarine attack were looked upon as cutthroats, and the modern submarine has been declared no less detestable. The secrecy of its attack, the deadliness of its purpose and its own immunity, at least until the genius of the war offices has discovered an antidote, have been declared utterly incompatible with the principle of fair play even in battle. The submarine, however, is generally considered a weapon of the weaker nation, and this opinion, as its admirers will tell you, is not a very convincing proof of the sincerity of the stronger nation's condemnation. Moreover, it is a long and tedious quest to discover any final criterion upon what is fair in war. The old adage has it that all things are fair; nor is it difficult to find in the history of any modern nation plenty of instances of practice which are condemned in an enemy only because the complaint lacks opportunity to practise them. England, for example, used lyddite shells against the Boers, and grieved sadly because the Boers responded with explosive bullets. Smokeless powder has been considered an unfair advantage by the side not equipped with it. England in case of war, to keep to the one example, would not use explosive bullets, fire on undefended towns, poison wells, attempt to assassinate a commander-in-chief, abuse a flag of truce or murder prisoners. But she would consider herself at perfect liberty to use submarine boats, torpedoes or mines, to discharge lyddite shells from balloons, to intercept an enemy's messages or to deceive him by false ones, to commence hostilities without formal declaration of war. The list is too long to

completely finish. The point is that the powers that be are hardly in a position to declare the submarine boat, now that it is in a fair way to prove its effectiveness, an illegitimate weapon.

In approaching the purely ethical side of the question we come naturally to the familiar theory that the perfecting of modern devices for mutual slaughter is the straight path to a universal peace. The theory has not been altogether borne out by recent experience. None of the very modern wars in which the very modern armaments have come into actual requisition have proved as deadly as might have been expected. The real test of course is yet to be made; but experience, so far as it has shown anything, points to the discovery of a method by which the big warship will be able to meet the deadly and unchivalrous little submarine, even if it becomes very much better adapted to carry out these deadly and unchivalrous intentions.

But just why is the submarine essentially a weapon of the weaker power? First, because it is a comparatively inexpensive weapon; second, because it is a menace to the biggest vessels of a hostile fleet; third, because of the moral effect of its presence in a blockaded harbor. To realize the meaning of this last reason needs a very scant equipment of recent naval history. The possible presence of submarine mines was the nightmare of naval officers both in the China-Japanese and in the Spanish-American wars; and the submarine boat, if its mechanism fulfils the promise of its present development, bids fair to become a moving submarine mine. With a number of submarines in any given port it is predicted that a practical blockade would become impossible. French enthusiasts have, for that matter, chuckled in advance over the destruction of an entire British navy, while the British navy has apparently been calmly watching the French enthusiasts and waiting for the psychological moment to profit by their investigations. As for the humanitarians, the submarine divides them into two parties; the one sees in the new craft more bloodshed and a deeper mixing of the so-called civilized world in the barbarism of naval and military conquest; the other sees in them the end of all sea fighting because of the added horror of a naval combat.

NEW WORKS OF LUNKENHEIMER CO.

The Lunkenheimer Co. of Cincinnati, O., manufacturers of brass and iron goods and specialties for engines, boilers, etc., such as brass and iron valves, whistles, injectors, lubricators, oil and grease cups, etc., on Saturday, Oct. 25, formerly opened their new works to about 3,000 visitors and friends and are now moving from their old quarters on Eighth street. The buildings, of which there are five, represent an investment of over $300,000, consisting of the main building occupied by the brass department with adjoining buildings for the iron department, brass foundry, power building and office building. All are of pressed brick and steel construction of modern type. They occupy about three acres of ground and have switching facilities. Three acres additional ground provide for future extension of the business.

These factories are located near Brighton station in a section called Fairmount, within two miles of the center of the city. It has been the aim of the company to construct the model plant in this industry and many new and interesting features are noticeable. The main building, 130x180 ft., is of gallery style construction with a center area measuring 30x80 ft; is three stories high and built so that three more stories can be added without interfering with the operation of the business. The elevators and iron staircases are arranged within the center area. All buildings are designed for 300 lbs. per square foot floor load. The roofs are of glass and clay tiling of Ludowici interlocking type.

A novel feature in the main building is the heating system, inasmuch as the hot air travels through the fourteen large hollow columns which support the floors around the area in the center of the building. These columns have openings on each floor to distribute the air. The bases of the columns are connected with a huge fan by means of tunnels under the basement floor. By this construction the usual galvanized iron pipes are done away with adding greatly to the simplicity of the building. The type of window used is a novel one, and has a blind arrangement that is of great advantage during summer weather. The foundry is equipped with modern appliances, such as overhead track system for carrying material, smelting furnaces burning crude oil and many pneumatic appliances, such as are used in the latest foundry practice. The general distribution of power throughout the buildings is the latest. The source of energy is a 300-H. P. compound engine which drives a 240-K. W., three-phase, 220-volt, General Electric, alternating current dynamo. The current is led out from a switchboard to the different parts of the buildings where suitable motors (principally attached to the ceiling) are provided to drive the various lines of shafting. These motors are of the Westinghouse and General Electric induction type without commutators or brushes. The power from the motors to the shafts are transmitted through what is known as the Renold silent chain gear, which permits of a very compact arrangement without noise or friction, thus dispenses with leather belts.

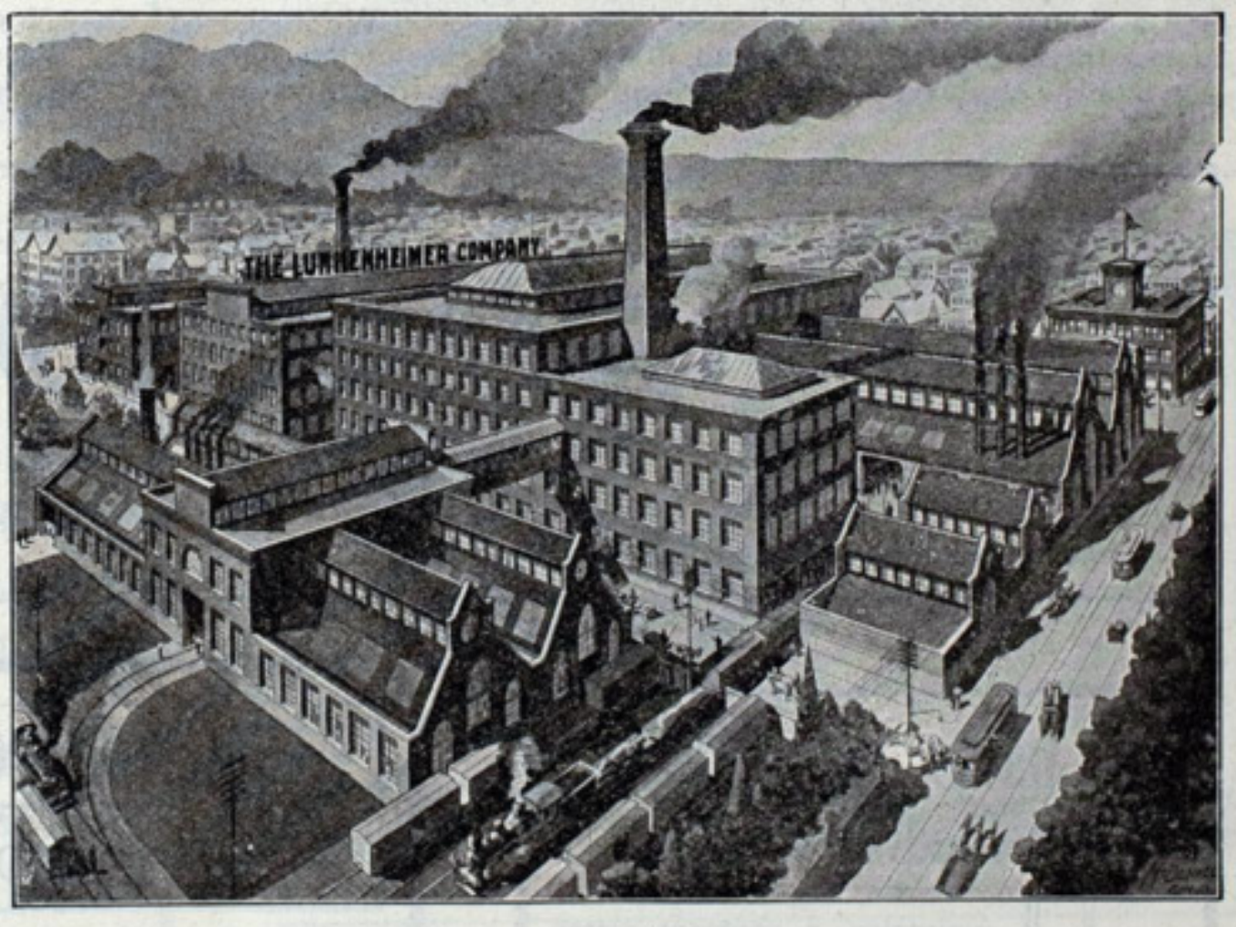
The engine room is also provided with a large cross-compound, two-stage, Laidlaw-Dunn-Gordon air compressor, which supplies compressed air throughout shops and foundry for driving pneumatic tools, hoists, etc. The boilers are of Babcock & Wilcox pattern with automatic stokers. The floor of the engine room is laid in mosaic tiling and is considered one of the handsomest in the country as the company manufactures engine and boiler fittings the aim was to have a power plant strictly up-to-date and of handsome appearance.

Bell telephones connect all departments to a central exchange which connects with the city lines, thus affording immediate communication from any point in the works.

Illumination is furnished by what is known as the Nernst lamp, made by the Nernst Lamp Co. of Pittsburg. This lamp has been going through a process of development for a number of years. It is now past the experimental stage and is being adopted throughout this and many foreign countries. The quality of light differs from that produced by any other artificial means, inasmuch as it more closely resembles sun-light than gas, incandescent or arc lights, and articles exhibited under have their true color value. Owing to the arrangement of the lamps, the distribution of the light is absolutely even and without shadows. The lamps are so arranged that sufficient illumination is secured without providing each operator with an individual light.

The office building is a three-story press brick structure, 50x80 ft., with modern equipment, the second floor being occupied by the draughting and engineering departments, and the third by advertising department, as well as a laboratory and photograph gallery.

The business was founded in 1862 by the late Frederick Lunkenheimer and has grown to large proportions, now employing over 700 men. With increased facilities the company expects to extend its line and take up many new engineering specialties. The company's trade is domestic and foreign, being distributed largely through jobbers. They have a branch store in London and branch office in New York. They have lately placed many orders for additional tools and machinery, which are being installed in their new quarters.



New Works of Lunkenheimer Co.

SHIP YARD NOTES.

The New York Ship Building Co., Camden, N. J., has been invited to tender bids for a new passenger steamer for the Fall River Line.

Boole & Son, Alameda, Cal., lately launched for Hinde, Rolfe & Co. of San Francisco, the barkentine Pauko. The vessel is 214-ft. keel, 41-ft. beam and 17-ft. deep.

The steamer John F. Klein, owned by the Pittsburg Dredging & Construction Co., was launched from the yard of A. Axton & Son, Brownsville, Pa., last Saturday. The steamer is 120-ft. long, 23-ft. wide and will draw 26 in. of water.

The new steel hull transfer steamer Pelican, being built by the Iowa Iron Works, Dubuque, Ia., for the railroad transfer business at Vicksburg, is to be sent down the river this fall to prevent her from being detained at Dubuque all winter by the ice. She will be finished at Cairo.

The steamship New York of the American Line has left the dry dock of the John N. Robins Co., Erie Basin, Brooklyn, N. Y., where she has been undergoing repairs to her hull for over a year. She will now be taken to Cramps, Philadelphia, where she will undergo reconstruction of engines and boilers.

The new ocean-going hydraulic dredge Gen. Abbott, was launched from the Petersburg Iron Works' yard, Petersburg, Va., on Monday of last week. She is to be used by the government in Charleston harbor. The dredge is 200-ft. long, 40-ft. wide and 20-ft. deep and will carry 30,000 cu. ft. of material.

TRADE NOTES.

Mr. Arthur Masters, naval architect, engineer and yacht broker, has moved into new and commodious quarters on the second floor of No. 29 Broadway, New York.

The Waterbury Brass Co., 122-130 Center street, New York, has issued a list showing stock of brass and copper in sheets, tubes, wire and rods, including a table of weights and measures. The catalogue is printed in two colors and is conveniently arranged for reference. The list is arranged in a most sensible manner.

A steam yacht 125 ft. in length which is being built by the Baltimore Marine Railway, Machine & Boiler Works, is to be very well equipped. In addition to triple-expansion engines, Almy water-tube boiler and Wheeler surface condenser, the vessel is to have an electric light plant, steam pump brake yacht windlass from the American Ship Windlass Co., and other modern devices.

Mr. J. W. Duntley, president of the Chicago Pneumatic Tool Co., sailed Tuesday, Nov. 4, for Europe. He expects to spend about four weeks on the continent and states that it is his intention to establish, either in England or Scotland, a new plant for the manufacture of pneumatic tools. The design of this new plant will be practically the same as that of the factory now being operated by his company at Detroit, which is said to be the finest equipped manufacturing establishment of its kind in the world. This move is made necessary by the large increase in the amount of business received by this company from England during the past few months.

The Sherwin-Williams Paint Co. of Cleveland is equipping all its work for electric power distribution. This company recently purchased for its Cleveland works three alternating-current generators of 150-K. W., 120-K. W. and 75-K. W, capacity. respectively, and about 500 H. P. in induction motors, which will be used to drive all their paint and varnish making machinery. The Newark, N. J., works has been equipped with one 75-K. W. A. C., engine-type generator and a number of motors. A duplicate plant is to be installed at the same works. At Pullman, Ill., they are putting in a 120-K. W. A. C. generator and one of 100-K. W., and about 200 H. P. in induction motors. The electrical apparatus for the several plants is being furnished by the Westinghouse Electric & Mfg. Co.

Reference was made in these columns not long ago to an important improvement—an elastic or cushioning device—in the Providence windlass, made by the American Ship Windlass Co. of Providence, R. I. The first windlass of this new type (it is new on account of the importance of the improvement), was installed on the large schooner Perry Setzer at Bridgeport, Conn. Capt. M. W. Blake, of the Setzer, now says: "We have had a chance to try the new cushioning windlass. We anchored at sea three different times, and in weighing the anchor we did not feel the slightest surge on the windlass or chain, although the bow of the vessel lifted about 3 ft. when on the crest of the wave, and the wave that lifted the anchor out of its sand bed caused the springs to compress about ¾ in. We also dropped anchor while the vessel was moving about 6 miles per hour and shut the brake down solid and stopped the vessel suddenly, and the springs compressed gently, so that we could not realize any surge. Everything works perfectly and smoothly and I am satisfied it is the best appliance ever invented for lying at anchor and getting anchor at sea.

BRIEF BUT FORCEFUL STORY.

Editor Marine Review.—Though now employed on shore, making my home in Boston, I once, not many years ago, made my home on the rolling deep, which is only a poet's way of designating a homeless condition. Thanks to an existing wrong in the present marine laws, I can now enjoy the luxury of a farmer's nights, my virgin slumbers undisturbed by unforeseen weather changes. In the interests of those, however, who still are wiping salt spray out of their eyes for hard tack and salt junk, I will describe my last ocean voyage, or rather, its termination, and the reason that caused me to terminate my career as a sailor bold.

A few years ago I left a hospital in Buenos Ayres, cured, and shipped before the mast on a Portland, Me., bark. If brevity is wit there can have been nothing humorous about this trip, as it took seventy-five days to reach Boston. We arrived there, however, safe, if not sound, on a certain Thursday, and as soon as the vessel was made fast we were commanded to take our "dunnage" ashore, the mate impatiently waiting our exit to lock the forecastle.

Having been told "you'll get paid off some time next week," and only having one dollar with which to play homeward bounder in this, to me, strange city, I had either to accept some boarding-master's doubtful hospitality, or "rough it." As a matter of fact I "roughed it" till the following Tuesday, when, being paid, I spat—for luck—upon each dollar received, and vowed never to go to sea again unless the laws regulating the paying of sailors were provided with back-stays, topping-lifts, or whatever our marine legal lights may call the gear necessary to make said laws ship-shape.

FRANK HANSON.

Boston, Mass., Oct. 31, 1902.

Surveyors are at work laying out a site for a third ore shipping dock to be erected by the Great Northern, or rather the Eastern Railway of Minnesota, at West Superior. The dock will be located on Allouez bay, just to the east of the present docks, which are held to be the largest ore shipping docks in the world. The new dock will probably have a shipping capacity of about 2,000,000 tons of ore a year. This will make the Great Northern's shipping capacity at Allouez bay about 6,000,000 a year. Work on the new dock will be started, it is expected, as soon as the bay freezes over.

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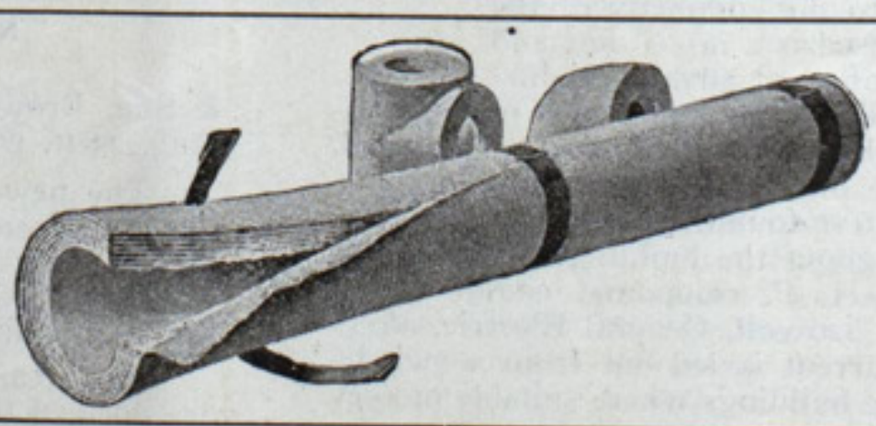

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DOMESTIC TRADE OF THE UNITED STATES.

The end of the first three-quarters of the calendar year affords a good point of retrospect from which to compare the volume of commercial improvements in the domestic trade of the United States with that of the preceding year. The September summary of internal commerce, issued by the treasury bureau of statistics, furnishes statistical returns for this purpose. Its reports show that the live stock traffic during September was larger than for the corresponding month in either of the two preceding years at the five markets of Chicago, Kansas City, Omaha, St. Louis and St. Jospeh taken together. A total of 56,996 car loads of stock were received during September, 1902, while 52,614 car loads arrived in September, 1901, and 50,716 car loads in September, 1900. In two years, therefore, there has been a gain of 6,280 cars, or 12.38 per cent. For the nine months ending with September, 5,284,432 head of cattle reached these markets, compared with 5,236,356 head in 1901, and 4,796,139 head in 1900. Receipts of hogs show a decrease, 11,467,792 having arrived for the first three-quarters of this year, 13,413,669 head in 1901, and 12,593,989 head in 1900.

Coastwise commerce on the great lakes for the nine months ending with September amounted to 40,102,870 tons of freight received, compared with 31,857,832 tons a year ago. The iron ore movement amounted to 20,098,066 tons, and the coal movement to 7,064,663 tons, shipped mainly from lower lake ports to domestic destinations. The registered tonnage movement for the nine months amounted to 55,134,073 net tons, representing 60,447 arrivals. At the Sault Ste. Marie canals freight passed amounting to 26,312,922 tons this season, compared with 20,369,065 tons in 1901, and 19,901,473 tons in 1900.

At the North Atlantic seaboard for nine months ending with September, 1902, the New York produce exchange reports 159,506,717 bu. of grain, and flour and meal reduced to bushels, received at Boston, New York, Philadelphia and Baltimore. For the corresponding period of 1901 the total receipts were 253,645,025 bu. September receipts at New York amounted to 12,694,132 bu., or 92.15 per cent. by rail; 1,009,000 bu. or 7.33 per cent. by canal; and 71,431 bu., or 0.52 per cent. by river and coast. At Boston for nine months ending with September this year, 20,521,481 bu. arrived, in contrast with 37,522,573 bu. in 1901, as reported by the chamber of commerce. At Philadelphia, grain receipts, including wheat, corn and oats for nine months were 13,685,944 bu. for the current year, as against 29,765,476 bu. in the first nine months of 1901, according to the commercial exchange of that city. The Baltimore chamber of commerce reports 16,336,471 bu. of wheat, corn, oats, and rye thus far this year, compared with 15,216,387 lbs. last year.

The amount of iron and steel originating in southern territory for nine months was 1,452,550 tons, compared with 1,233,048 tons for the first nine months of 1901. Receipts of naval stores at eleven southern primary markets this season to the first Friday in September amounted to 812,737 bbls. of rosin and 301,388 casks of turpentine, compared with 972,193 bbls. of rosin last year, and 334,184 casks of turpentine. The sales of leaf tobacco at Southern markets for the commerical year ending Oct. 1 were as follows: At Danville, Va., 33,685,062 lbs., compared with 37,134,068 lbs. last year; at Richmond, Va., 7,176,000 lbs., compared with 6,564,269 lbs. last year: at Lynchburg, Va., 21,746,100 lbs., compared with 21,708,800 lbs. last year; at Durham, N. C., 7,100,000 lbs. (approximately), compared with 9,462,000 lbs. last year; and at Winston, N. C., 12,668,400 lbs., compared with 15,216,387 lbs. last year.

Coastwise shipments of coal from New York, Philadelphia, Baltimore and Newport News during the month of August were reported to the amount of 795,676 tons, and for the eight months ending with August 10,448,068 tons. The total arrivals of coal at Boston for September were 208,294 tons, and for September, 1901 nearly twice that amount, or 396,210 tons. For the nine months ending with September this year, 2,944,207 tons were received, compared with 3,710,593 tons in 1901. The shipping arrivals at New York for nine months totaled 9,225 vessels, of which 5,322 represented coastwise, and 3,343 foreign commerce. At Philadelphia the arrivals ending with September were 3,841 vessels, of which 969 represented foreign, and 2,872 coastwise trade. During August, 1902, the port of Baltimore reports 1,721 vessels arriving, of which 1,474 were sailing vessels, and 247 steam vessels.

Shipments of redwood from upper California to the end of September amounted to 191,268,206 ft. this year, compared with 161,100,502 ft. last year. For the current season, beginning with Nov. 1, 1901, 17,205 car loads of citrus fruit were shipped from southern California to Oct. 1, compared with 24,186 carloads last season. At the port of Tacoma the inward and outward cargo tonnage movement for the first three-quarters of the current year totaled 806,362 tons, compared with 853,713 tons for the corresponding period in 1901.

Of commercial movements on rivers and canals, that of the Monongahela is reported as amounting to 7,040,738 tons to the end of September. The freight tonnage through the canal and over the falls at Louisville shows a grand total of 1,541,880 tons, of which 727,317 tons were coal. Tonnage moved through the New York state canals for the season to Sept. 30 this year was 2,176,740 tons, compared with 2,445,747 tons a year ago.

Anthracite coal movements to the end of September this year are reported as amounting to 19,840,869 tons, compared with 40,224,426 tons in 1901, and 34,202,719 tons in 1900. Out of 28,115,097 tons of coal originating on the Pennsylvania lines east of Pittsburg and Erie, to Sept. 27 of this year, 1,619,406 tons were anthracite, compared with 3,433,192 tons last year; 19,232,194 tons were bituminous, compared with 14,594,628 tons last year; and 7,263,497 tons were coke, compared with 6,017,577 tons last year. For the five months ending with August this year, the Baltimore and Ohio coal and coke movement amounted to 7,055,253 tons,

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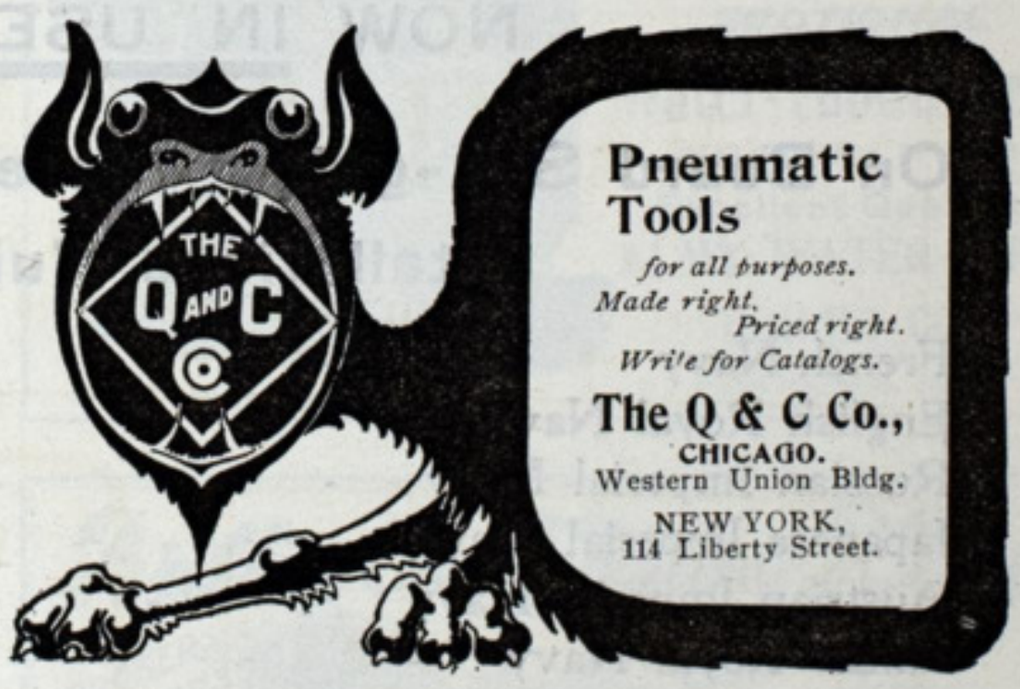

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and for the eight months to the end of August, 14,085,612 tons. The Norfolk and Western coal and coke shipments reached 4,886,953 tons for seven months ending with July, and 4,102,095 tons for the corresponding period of 1901.

CLOSED TO FOREIGN VESSELS.

A point for which the ship building interests of Canada have long contended has at last been conceded. This is the closing of the Canadian coasting trade against foreign-built vessels whose only title to engage in it is a British register. Heretofore vessels, no matter in what non-British country built, were free to carry between Canadian ports if they were registered in the United Kingdom. Vessels that have been admitted on that ground are to continue in the enjoyment of the privilege but the right is not to be extended to other vessels. Foreign-built vessels of British register, not already in the coasting trade, can now enter it only by paying the vessel duty provided for in the tariff. An act to this effect was passed at the last session of the Dominion parliament, but as it effected imperial powers it was referred to the British government before it was put in force. The British government has not felt that it could properly object to it and has so signified to the Ottawa authorities. Hence the act has been duly brought into force by proclamation. A few years ago an American-built vessel obtained a provisional British register from the British consul at Chicago, and with this warrant proceeded to take part in the coasting trade of Canada. She was seized for customs duty and after varying results in the courts the case is still pending. A more frequent practice is to have vessels of non-British origin registered in the nearest British colony outside of Canada, that is, Newfoundland, and upon the strength of that authority to ply between Canadian ports. By this procedure many of the vessels carrying coal between Nova Scotia and ports on the St. Lawrence got their status in that traffic. By putting an end to this mode of adding to the capacity of the domestic marine the act benefits Canadian ship builders.

POINTS IN ADMIRAL O'NEIL'S REPORT.

According to the annual report of Rear Admiral Charles O'Neil, part of which was published in the Review of last week, the gun factory at the Washington navy yard during the past year turned out 234 guns, prepared sets for forgings for 146 more, and has sixty-five in course of manufacture. The bureau is preparing a new type of 3-in. gun 50 calibers in length, of a semi-automatic character, to replace all guns of this size now in use in the navy. Admiral O'Neil says that for the first time in years the manufacture of armor has progressed in a satisfactory manner, 7,612 tons having been delivered at the various ship yards during the year, with prospects of largely increasing the deliveries.

The manufacture of smokeless powder during the past year has progressed in a satisfactory manner, so far as quality is concerned, but not so much as to the amount delivered. So far as the stability of the smokeless powder is concerned, the results of the year's work have been of the most satisfactory character, and with few exceptions the ballistic qualities of the powder have remained unchanged.

Admiral O'Neil has much to say respecting speed versus armament. He argues that a ship is naturally a compromise between various necessities, and says: "It has always been the policy of the United States to provide its vessels of all classes with great battery power; that is, to so arm them that they shall be superior to foreign vessels of equal class in that respect, and that sentiment still prevails; and while we have in a few instances subordinated all other elements to speed, it is not likely to occur again, and the concensus of opinion at the present time is in favor of applying large percentages of weight for armor and armament rather than to assigning it for the purpose of attaining the last possible fraction of a knot of speed."

The last chapter of the report is devoted to an urgent plea for the better instruction of officers and men in gunnery. Admiral O'Neil wants more and better gun pointers, and he especially urges young officers each to take up at least one feature of ordnance work, mechanical, or chemical, or mathematical, or in connection with torpedoes, and to master it thoroughly.

MISCELLANEOUS MATTERS.

George Welt, Waldoboro, Me., has just stretched the keel for a five-masted wooden schooner.

Percy & Small, Bath, Me., are building a duplicate of the four-masted wooden schooner Margaret Ward.

The Japanese government has adopted a naval program which involves an annual expenditure of $8,250,000 for ten years. Included in the program are four first-class battleships and six first-class cruisers.

The Chesapeake & Ohio railway has chartered three new ships to accommodate their increasing London and Liverpool trade. They are the Sylvania, Cebriana and Dalton Hall, chartered from the Furness-Withy Co.

A two hours' full-speed trial trip of the monitor Wyoming was held in the open sea last week. The mean revolutions for the two hours were 201.3. This corresponds to a speed of 11 8 knots. The general behavior of the monitor in moderate sea and breeze was satisfactory.

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The "Messageries Maritimes" Company	87,600 "
Chemins de fer de l'Ouest: (The French Western Railway Co.) Steamships plying between Dieppe and Newhaven	18,500 "
Total Horse Power of Boilers in Use	1,501,520

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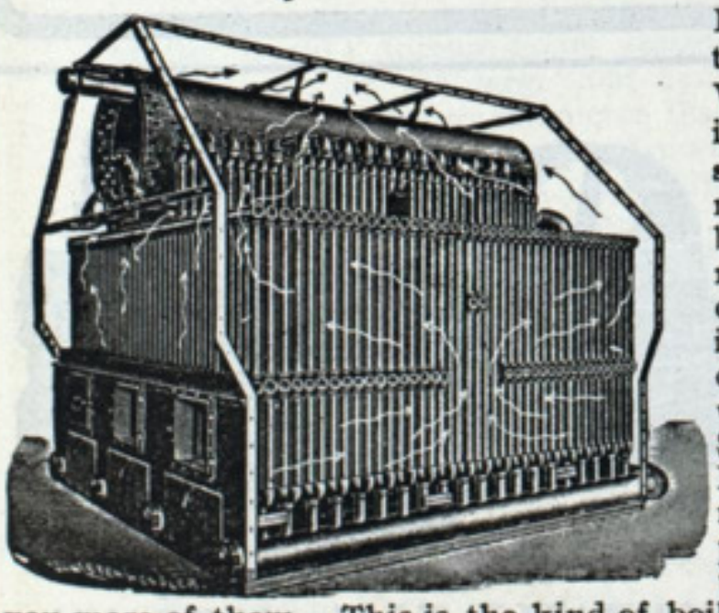

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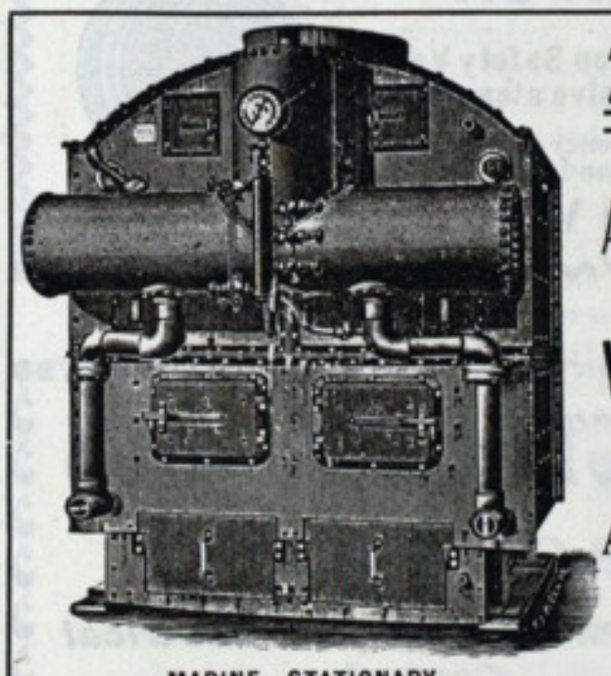

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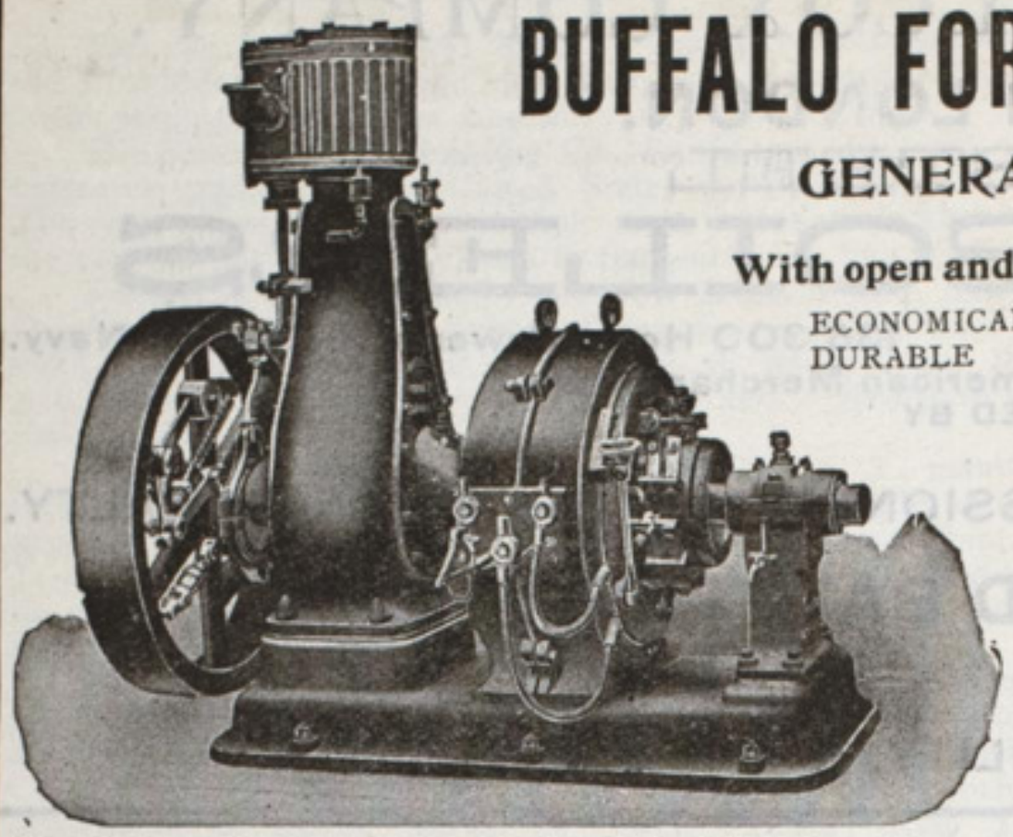

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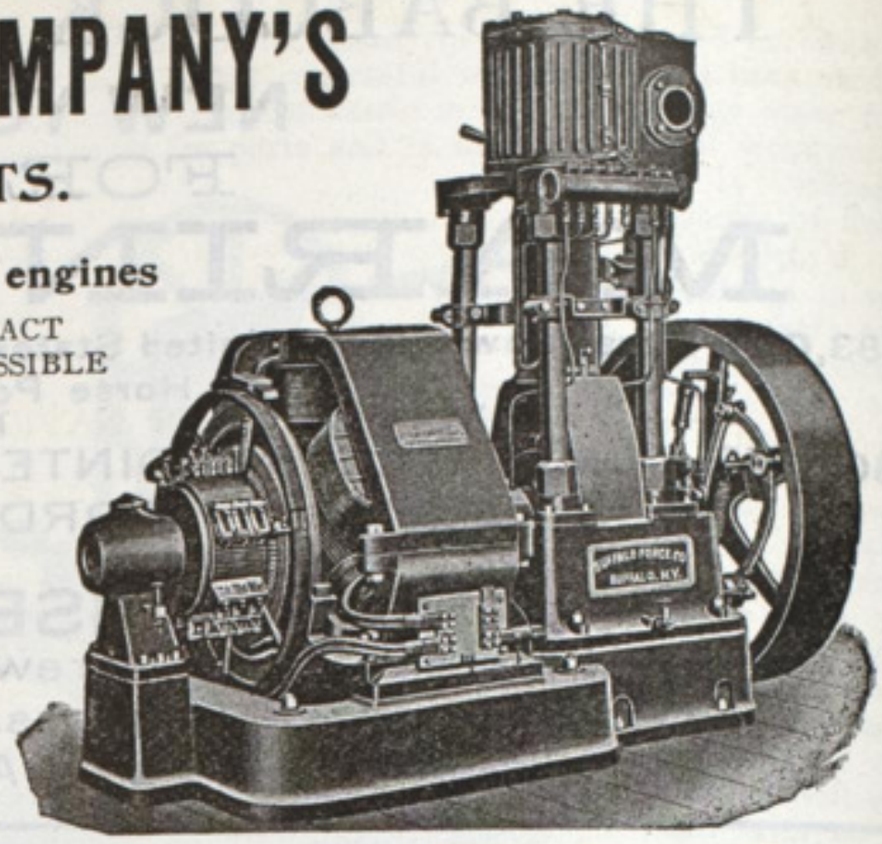

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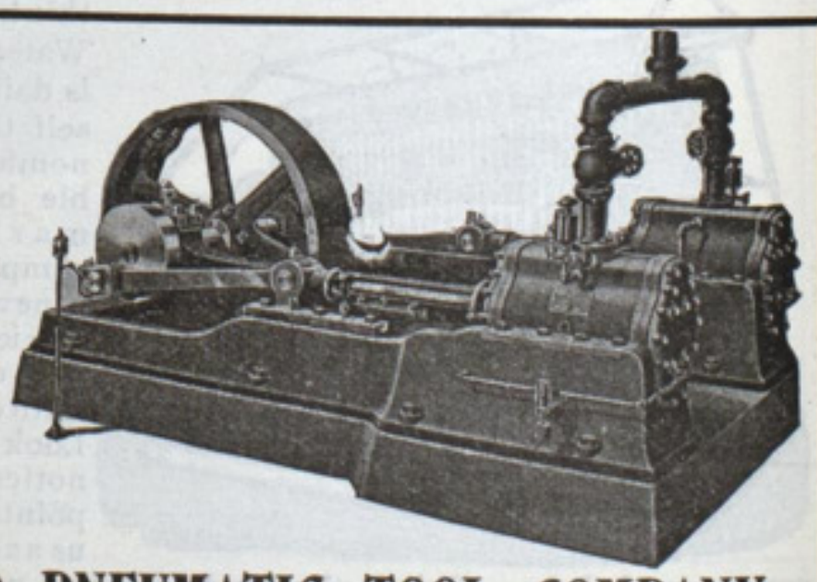

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